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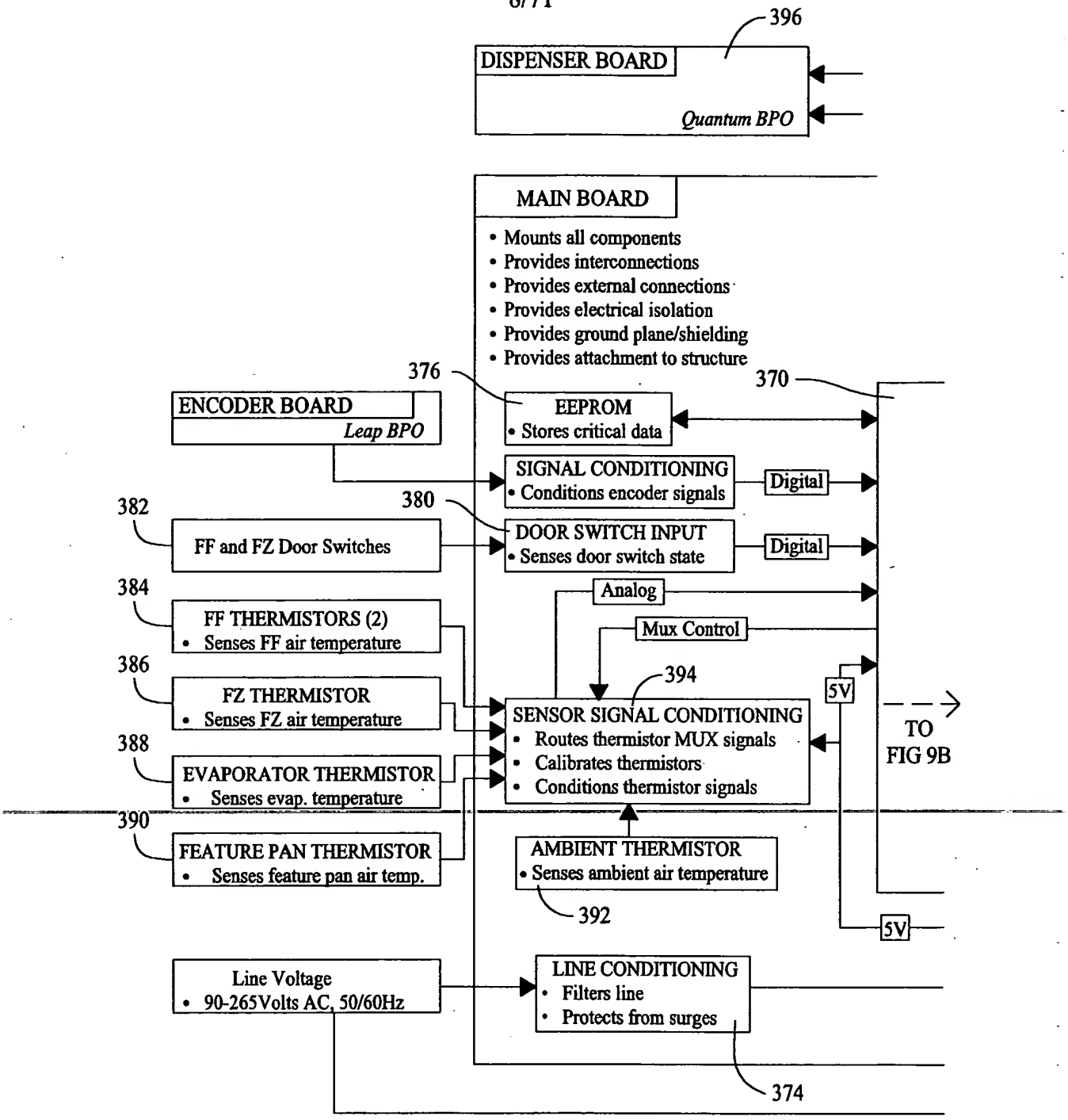

396
DISPENSER BOARD
Quantum BPO
MAIN BOARD
• Mounts all components
• Provides interconnections
• Provides external connections
• Provides electrical isolation
• Provides ground plane/shielding
• Provides attachment to structure
376
370
ENCODER BOARD
Leap BPO
EEPROM
• Stores critical data
SIGNAL CONDITIONING
• Conditions encoder signals
Digital
380
382
FF and FZ Door Switches
DOOR SWITCH INPUT
• Senses door switch state
Digital
384
FF THERMISTORS (2)
• Senses FF air temperature
Analog
Mux Control
386
FZ THERMISTOR
• Senses FZ air temperature
394
5V
SENSOR SIGNAL CONDITIONING
• Routes thermistor MUX signals
• Calibrates thermistors
• Conditions thermistor signals
TO
FIG 9B
388
EVAPORATOR THERMISTOR
• Senses evap. temperature
390
FEATURE PAN THERMISTOR
• Senses feature pan air temp.
AMBIENT THERMISTOR
• Senses ambient air temperature
392
5V
Line Voltage
• 90-265Volts AC, 50/60Hz
LINE CONDITIONING
• Filters line
• Protects from surges
374

FIG. 9A

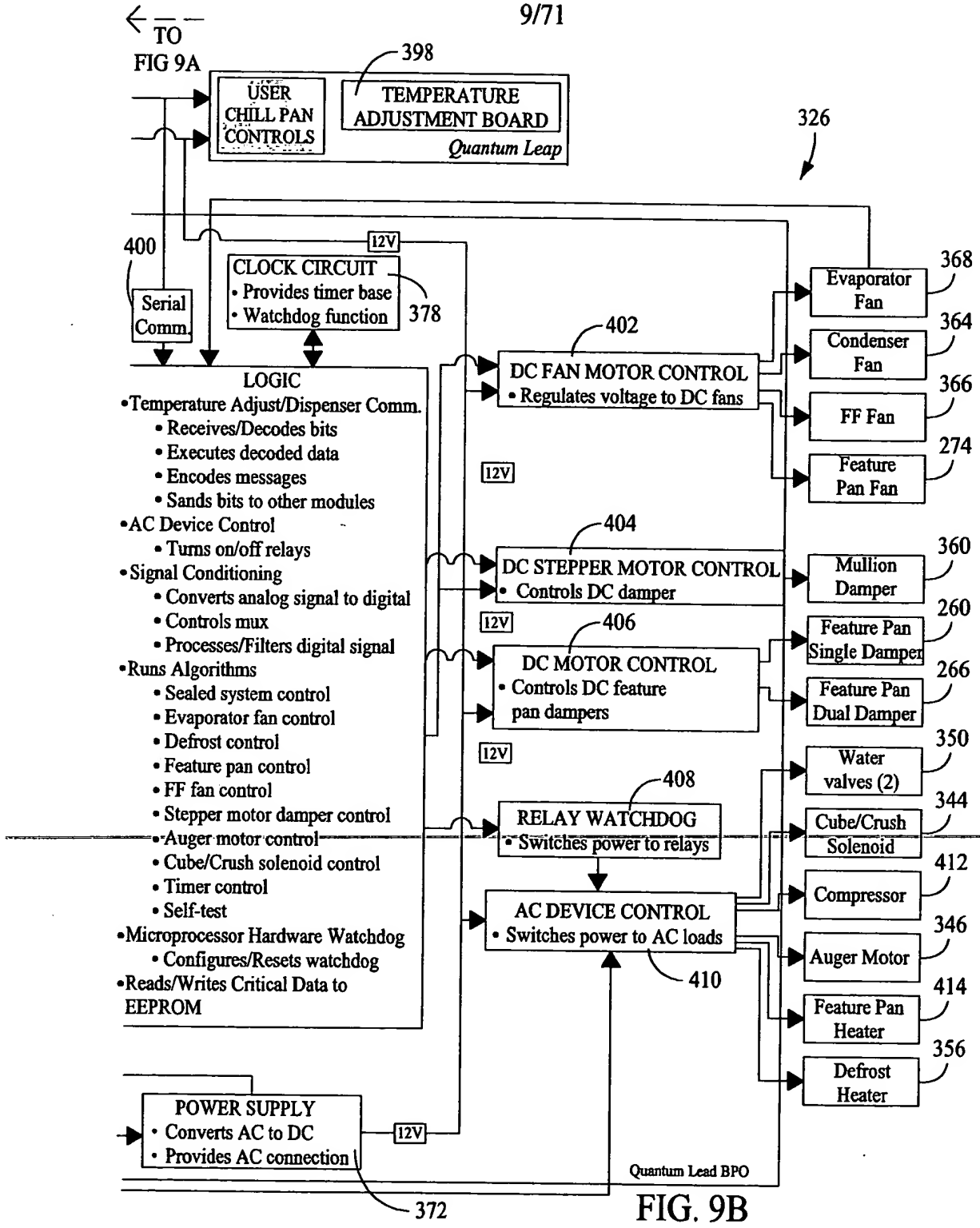

TO FIG 9A
398
USER CHILL PAN CONTROLS
TEMPERATURE ADJUSTMENT BOARD
Quantum Leap
326
400
Serial Comm.
12V
CLOCK CIRCUIT
• Provides timer base
• Watchdog function
378
LOGIC
•Temperature Adjust/Dispenser Comm.
• Receives/Decodes bits
• Executes decoded data
• Encodes messages
• Sands bits to other modules
•AC Device Control
• Turns on/off relays
•Signal Conditioning
• Converts analog signal to digital
• Controls mux
• Processes/Filters digital signal
•Runs Algorithms
• Sealed system control
• Evaporator fan control
• Defrost control
• Feature pan control
• FF fan control
• Stepper motor damper control
• Auger motor control
• Cube/Crush solenoid control
• Timer control
• Self-test
•Microprocessor Hardware Watchdog
• Configures/Resets watchdog
•Reads/Writes Critical Data to EEPROM
402
DC FAN MOTOR CONTROL
• Regulates voltage to DC fans
12V
404
DC STEPPER MOTOR CONTROL
• Controls DC damper
12V
406
DC MOTOR CONTROL
• Controls DC feature pan dampers
12V
408
RELAY WATCHDOG
• Switches power to relays
AC DEVICE CONTROL
• Switches power to AC loads
410
POWER SUPPLY
• Converts AC to DC
• Provides AC connection
12V
372
Quantum Lead BPO
Evaporator Fan
368
Condenser Fan
364
FF Fan
366
Feature Pan Fan
274
Mullion Damper
360
Feature Pan Single Damper
260
Feature Pan Dual Damper
266
Water valves (2)
350
Cube/Crush Solenoid
344
Compressor
412
Auger Motor
346
Feature Pan Heater
414
Defrost Heater
356

FIG. 9B

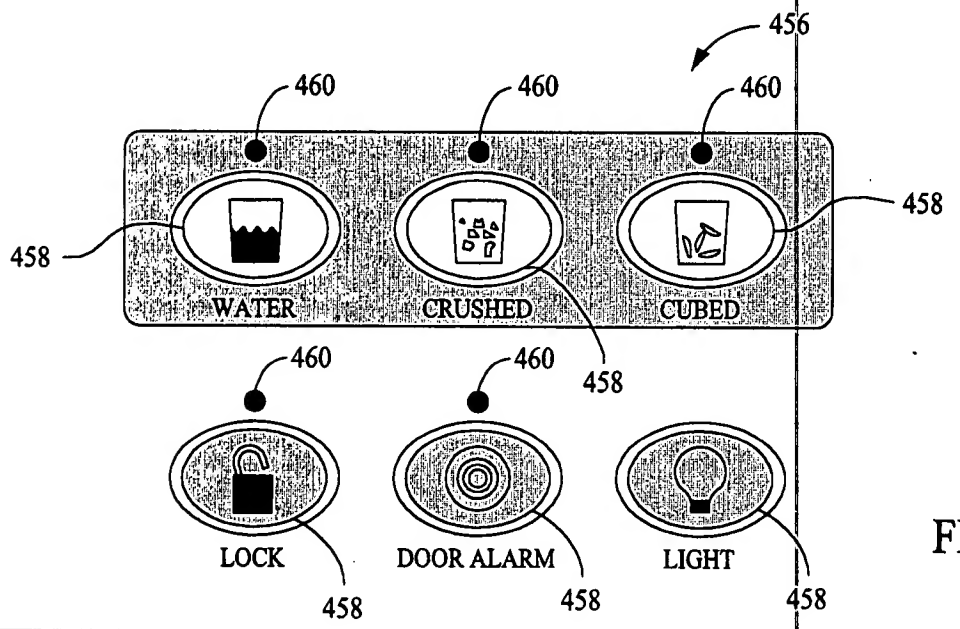


FIG. 15

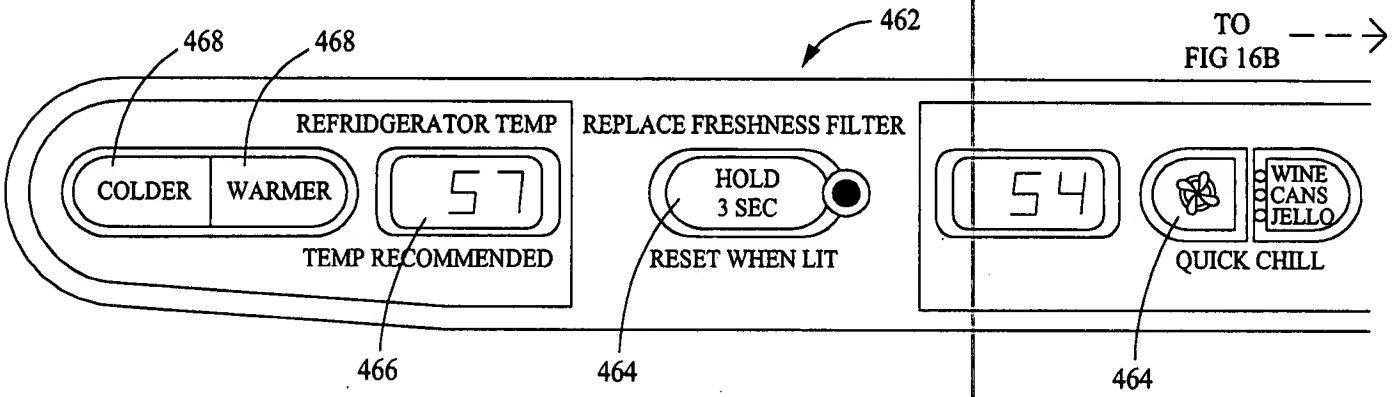


FIG. 16A

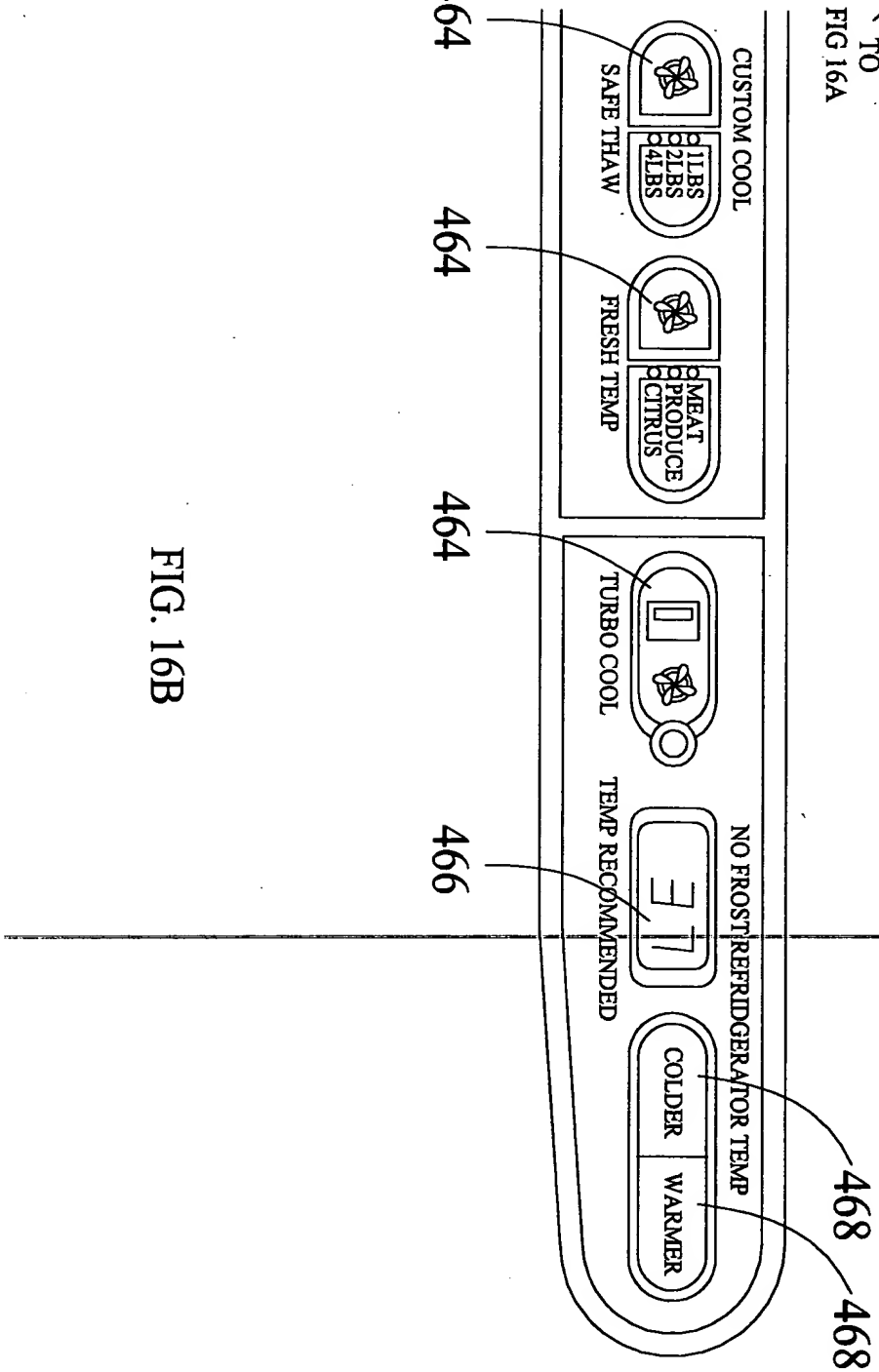

TO FIG 16A
CUSTOM COOL
SAFE THAW
1LBS
2LBS
4LBS
FRESH TEMP
MEAT
PRODUCE
CITRUS
TURBO COOL
NO FROST REFRIDGERATOR TEMP
COLDER
WARMER
TEMP RECOMMENDED
464
464
464
466
468
468

FIG. 16B

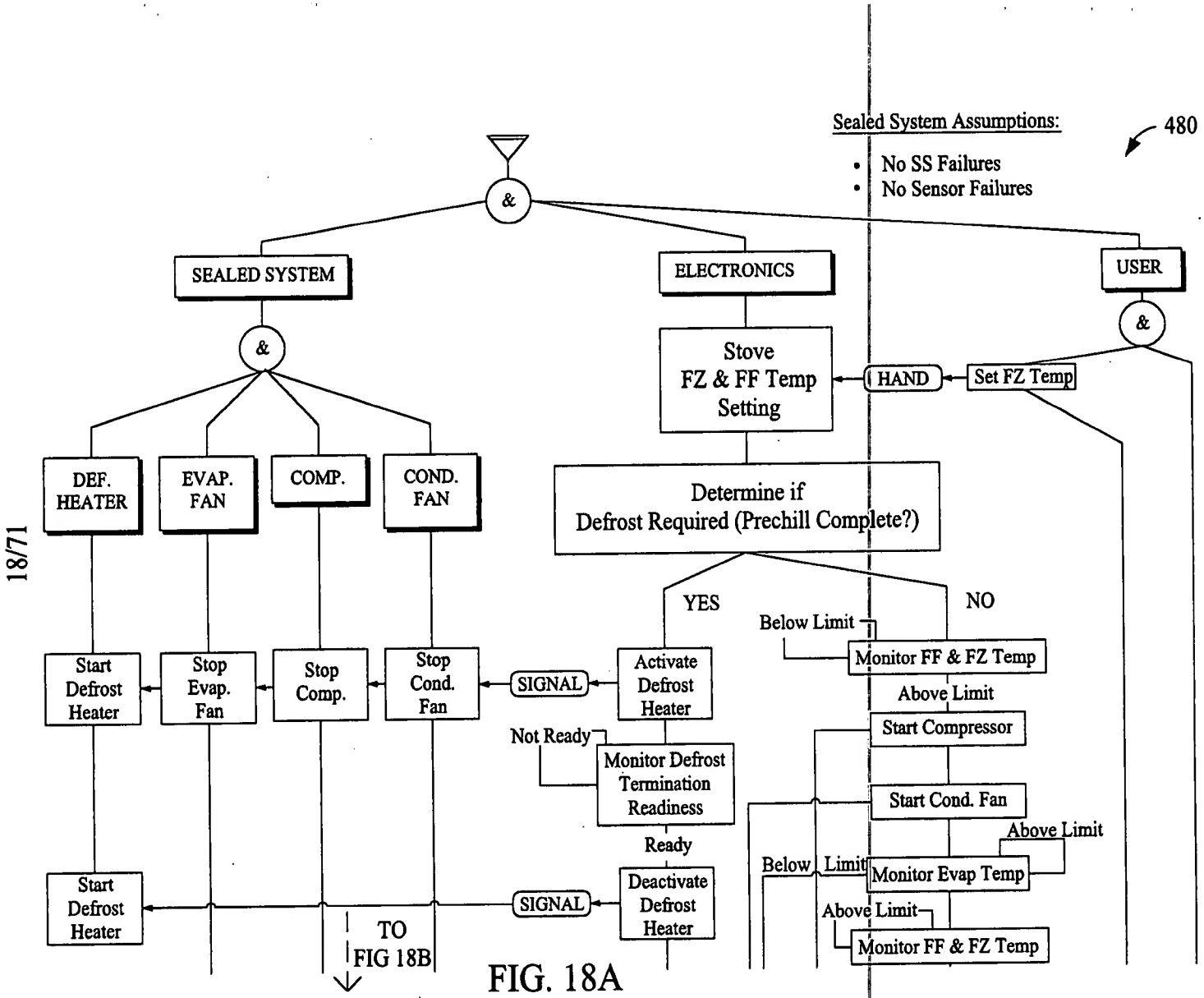

Sealed System Assumptions:
480
• No SS Failures
• No Sensor Failures
&
SEALED SYSTEM
ELECTRONICS
USER
&
&
Stove FZ & FF Temp Setting
HAND
Set FZ Temp
DEF. HEATER
EVAP. FAN
COMP.
COND. FAN
Determine if Defrost Required (Prechill Complete?)
YES
NO
Below Limit
Start Defrost Heater
Stop Evap. Fan
Stop Comp.
Stop Cond. Fan
SIGNAL
Activate Defrost Heater
Monitor FF & FZ Temp
Above Limit
Not Ready
Monitor Defrost Termination Readiness
Start Compressor
Start Cond. Fan
Above Limit
Ready
Below Limit
Monitor Evap Temp
Start Defrost Heater
SIGNAL
Deactivate Defrost Heater
Above Limit
Monitor FF & FZ Temp
TO FIG 18B

FIG. 18A

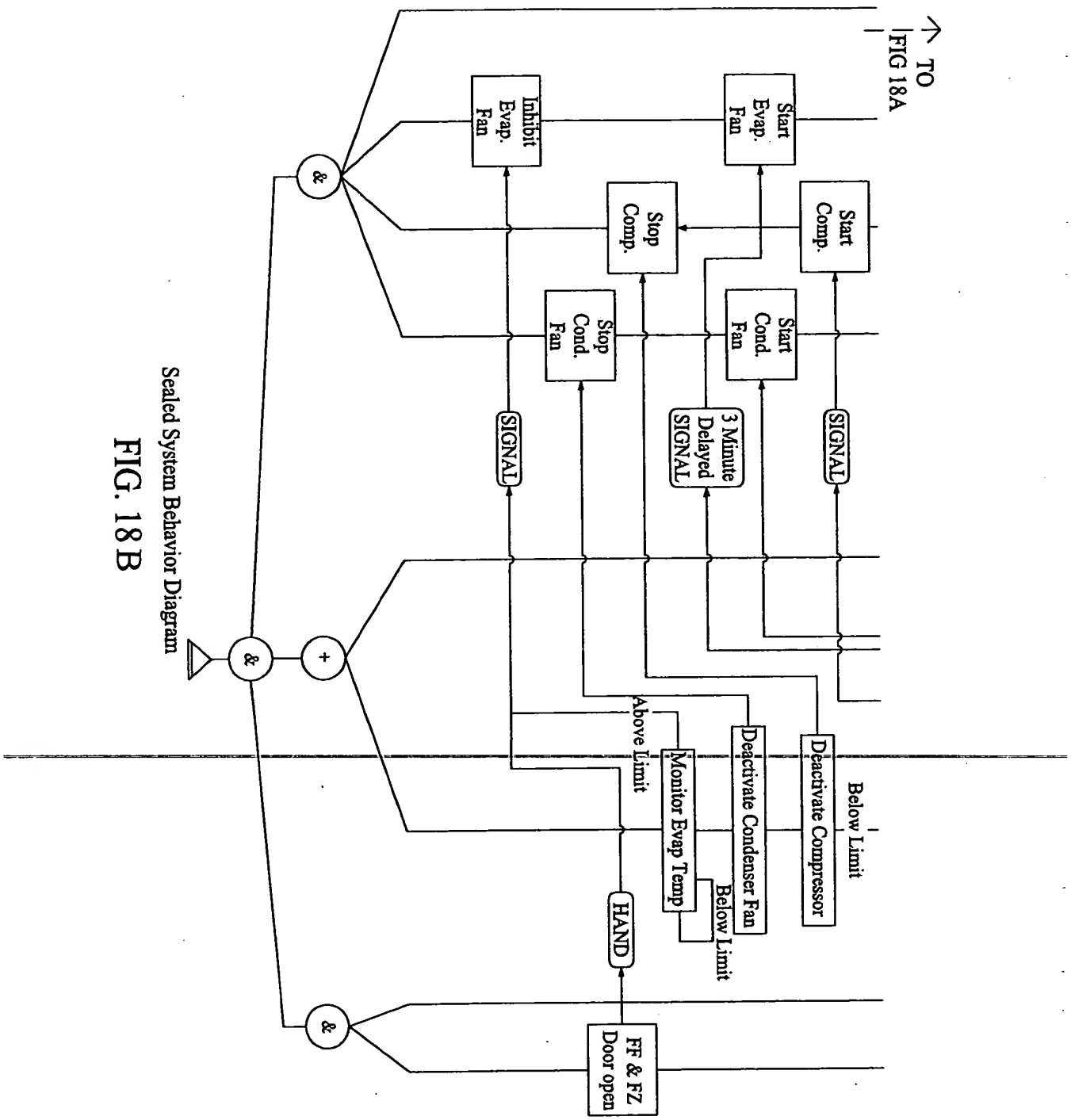
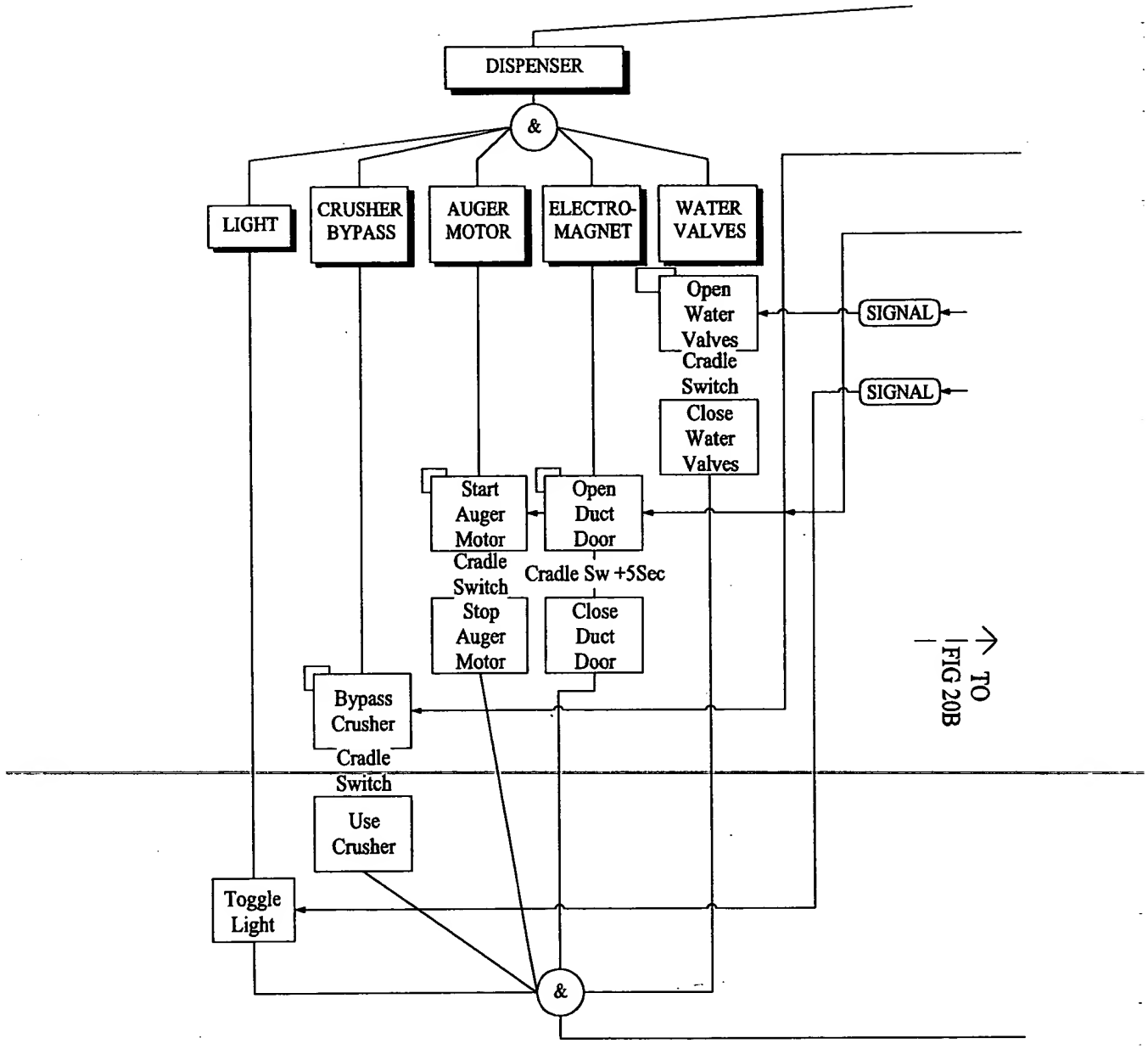

TO FIG 18A
Start Evap. Fan
Inhibit Evap. Fan
Start Comp.
Stop Comp.
Start Cond. Fan
Stop Cond. Fan
SIGNAL
3 Minute Delayed SIGNAL
SIGNAL
&
&
+
Above Limit
Deactivate Compressor
Below Limit
Deactivate Condenser Fan
Monitor Evap Temp
Below Limit
HAND
&
FF & FZ Door open
Sealed System Behavior Diagram

FIG. 18B



Dispenser Behavior

FIG. 20A

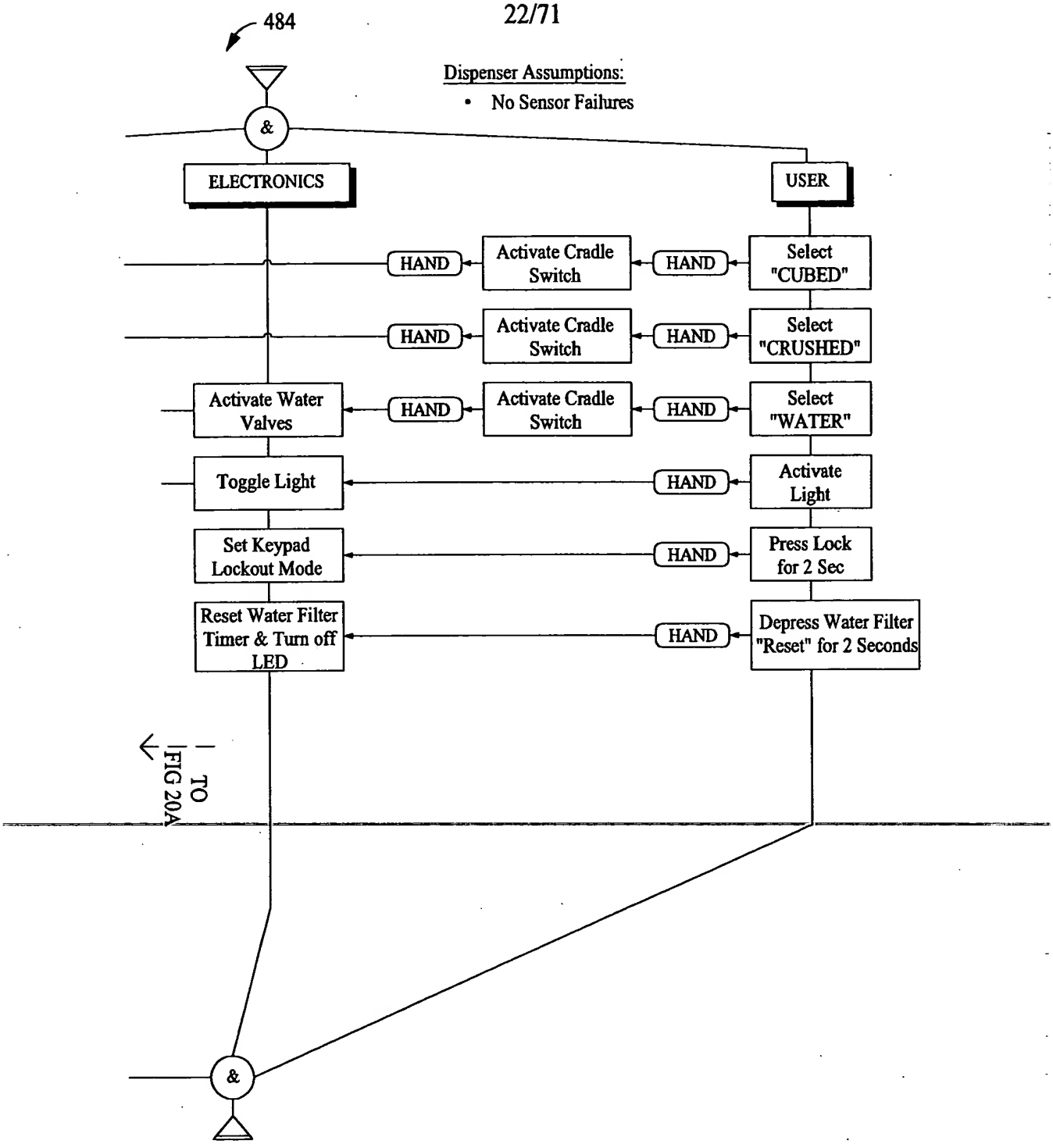
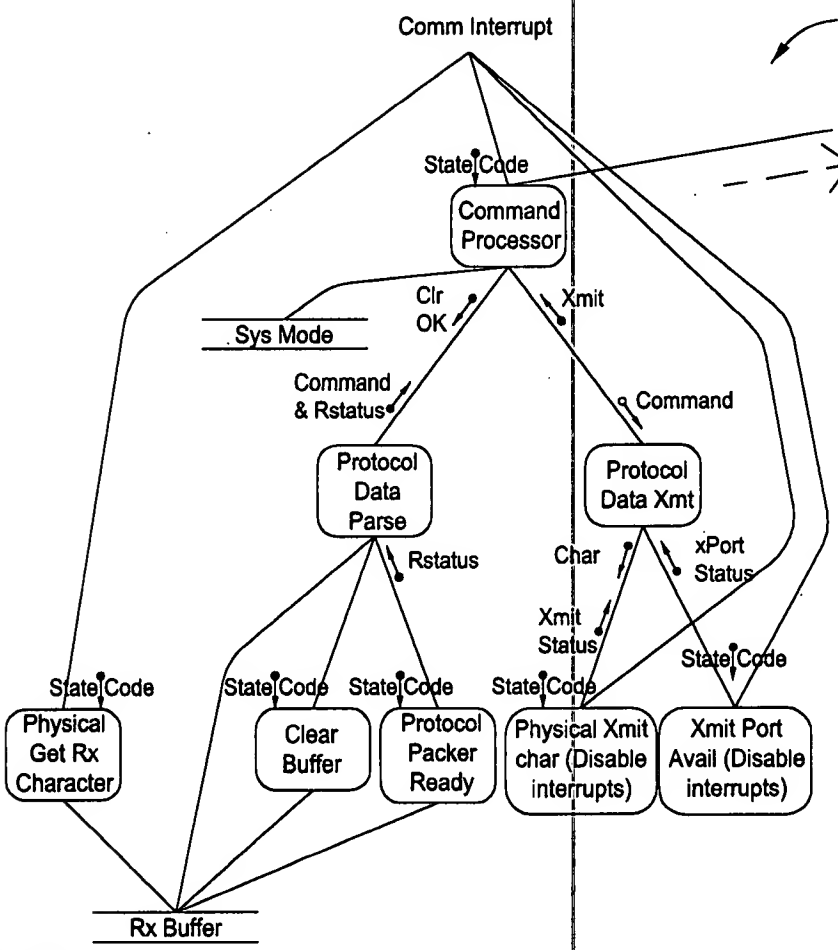

484
Dispenser Assumptions:
• No Sensor Failures
&
ELECTRONICS
USER
HAND
Activate Cradle Switch
HAND
Select "CUBED"
HAND
Activate Cradle Switch
HAND
Select "CRUSHED"
Activate Water Valves
HAND
Activate Cradle Switch
HAND
Select "WATER"
Toggle Light
HAND
Activate Light
Set Keypad Lockout Mode
HAND
Press Lock for 2 Sec
Reset Water Filter Timer & Turn off LED
HAND
Depress Water Filter "Reset" for 2 Seconds
TO FIG 20A
&

FIG. 20B



Note: Any Routine is allowed to read a data store
The command processor can read or write
any data store.
Dashed line indicates a path for initialization only

FIG. 41A

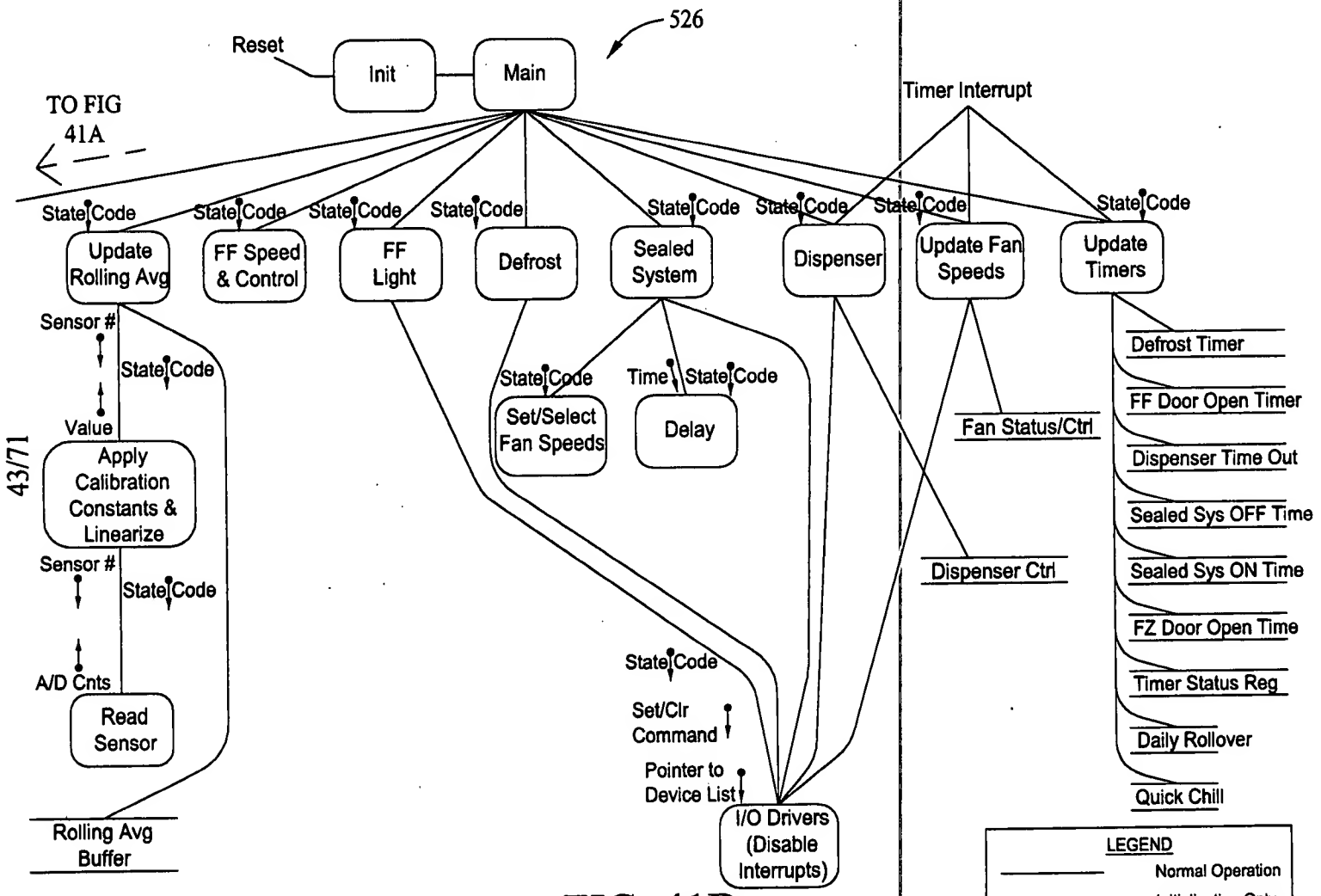

526
Reset
Init
Main
TO FIG 41A
Timer Interrupt
State Code
Update Rolling Avg
FF Speed & Control
FF Light
Defrost
Sealed System
Dispenser
Update Fan Speeds
Update Timers
Sensor #
Value
Apply Calibration Constants & Linearize
A/D Cnts
Read Sensor
Rolling Avg Buffer
Set/Select Fan Speeds
Time
Delay
Fan Status/Ctrl
Dispenser Ctrl
Set/Clr Command
Pointer to Device List
I/O Drivers (Disable Interrupts)
Defrost Timer
FF Door Open Timer
Dispenser Time Out
Sealed Sys OFF Time
Sealed Sys ON Time
FZ Door Open Time
Timer Status Reg
Daily Rollover
Quick Chill
LEGEND
Normal Operation
Initialization Only
43/71

FIG. 41B

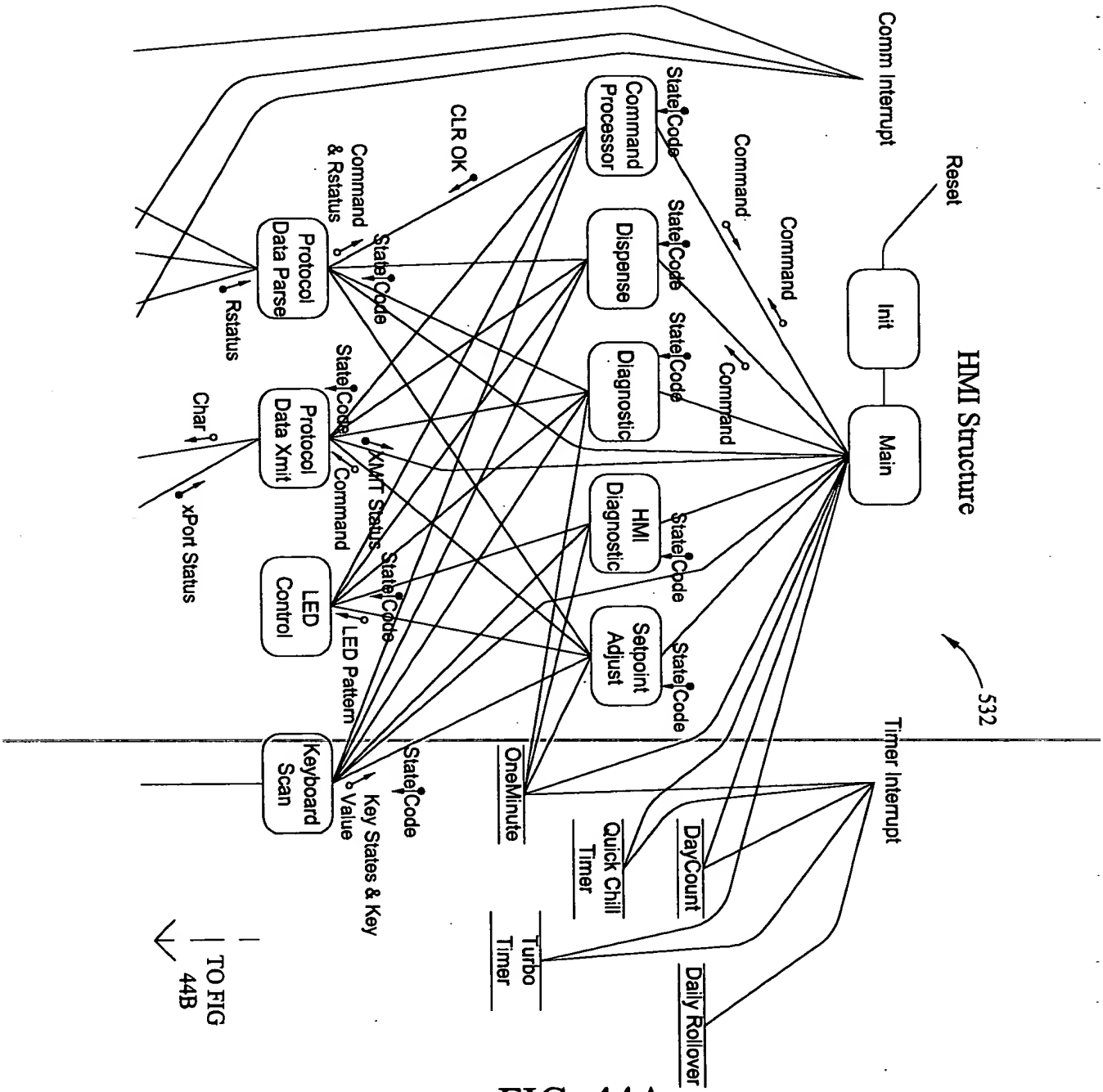

HMI Structure
532
Reset
Comm Interrupt
Timer Interrupt
Init
Main
Command Processor
Dispense
Diagnostic
HMI Diagnostic
Setpoint Adjust
Protocol Data Parse
Protocol Data Xmit
LED Control
Keyboard Scan
OneMinute
DayCount
Quick Chill Timer
Turbo Timer
Daily Rollover
State Code
Command
CLR OK
Command & Rstatus
Rstatus
Char
xPort Status
XMT Status
LED Pattern
Key States & Key Value
TO FIG 44B

FIG. 44A

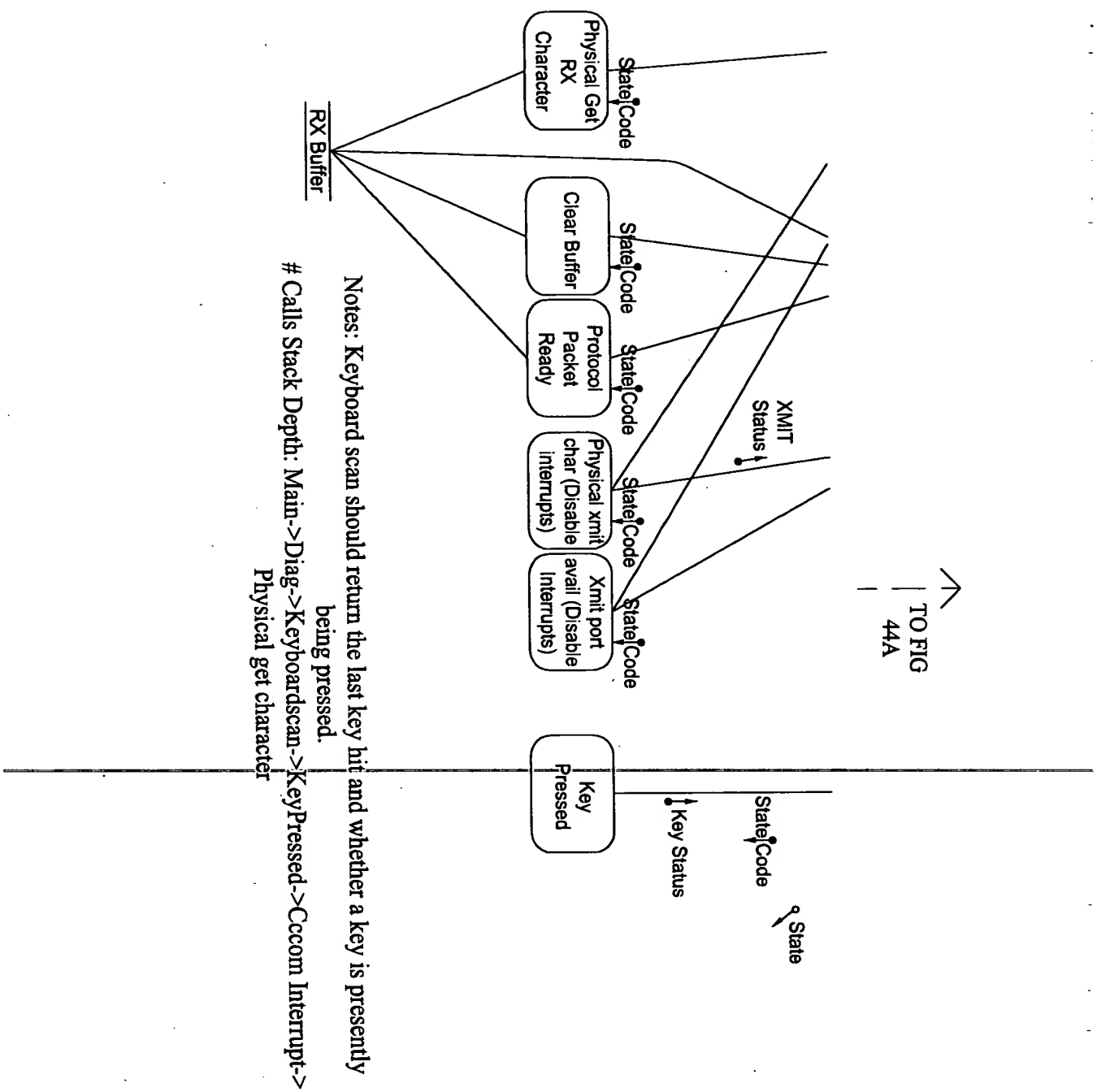

TO FIG 44A
Physical Get RX Character
Clear Buffer
Protocol Packet Ready
Physical xmit char (Disable interrupts)
Xmit port avail (Disable interrupts)
Key Pressed
State Code
XMIT Status
Key Status
State
RX Buffer
Notes: Keyboard scan should return the last key hit and whether a key is presently being pressed.
Calls Stack Depth: Main->Diag->Keyboardscan->KeyPressed->Cccom Interrupt->Physical get character

FIG. 44B

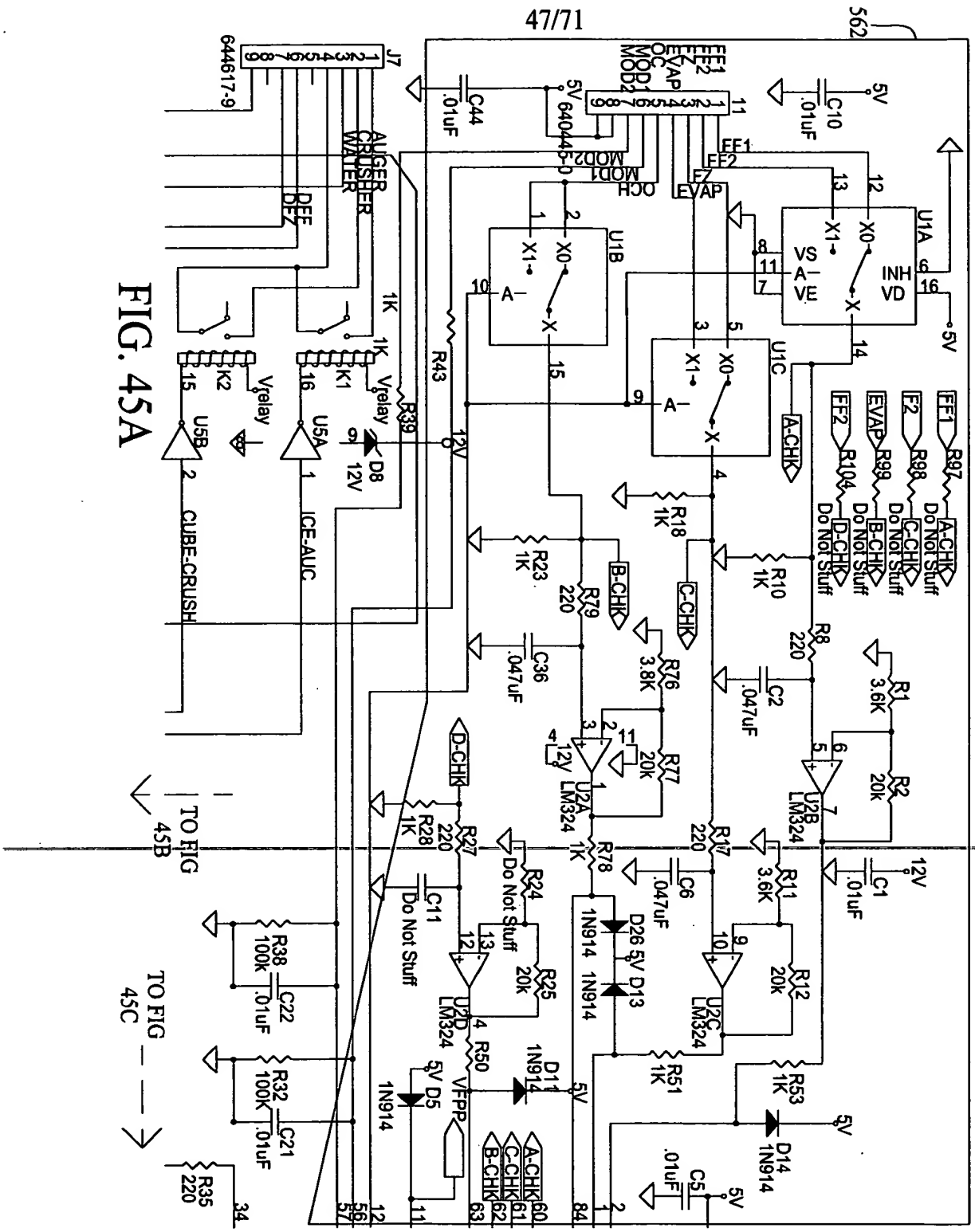
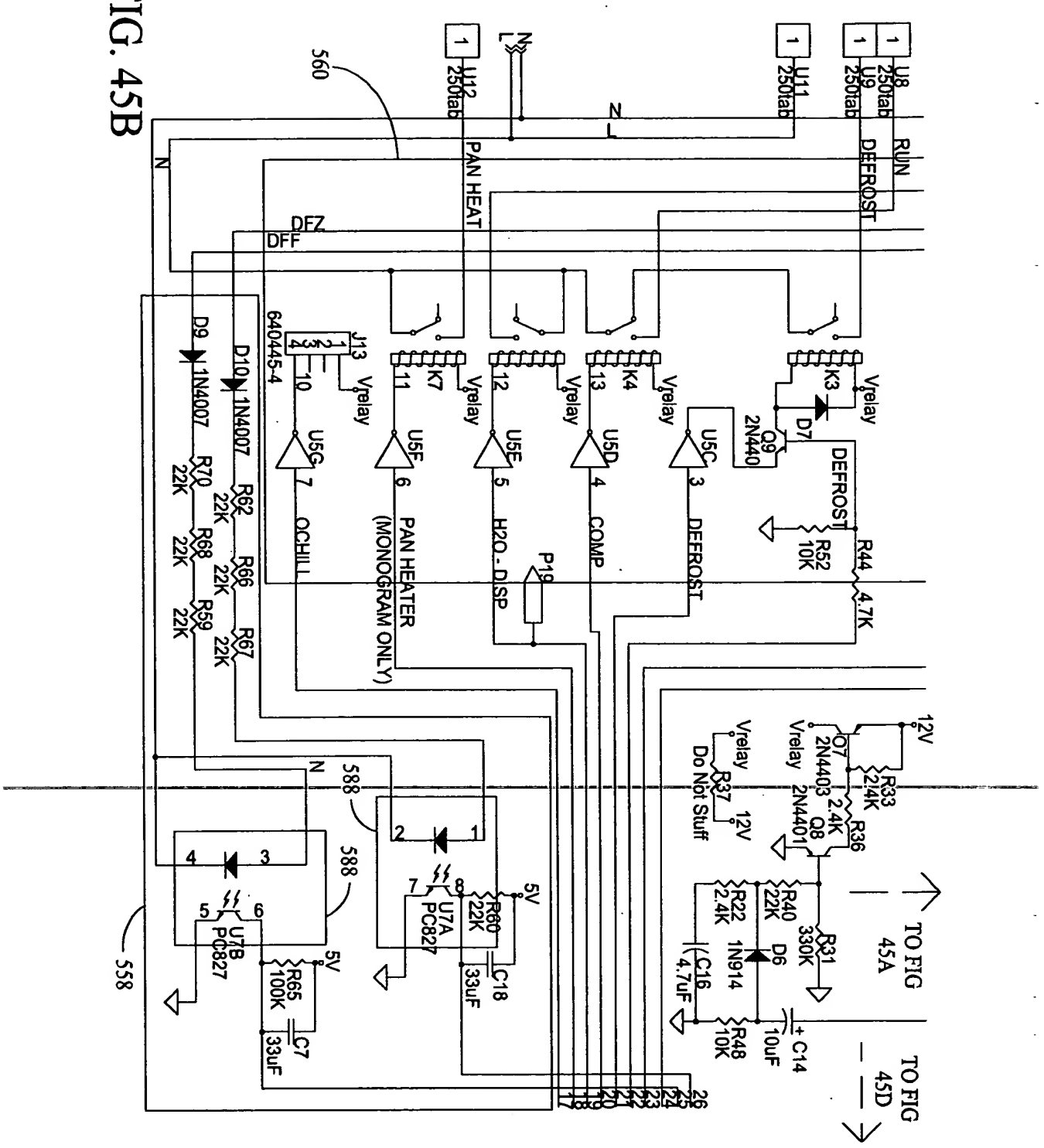

562
J7
644617-9
AUGER
CRUSHER
WATER
DEF
DEF
C44
.01uF
5V
C10
.01uF
FF1
FF2
EVAP
OCH
MOD1
MOD2
U1A
U1B
U1C
VS
A-
VE
INH
VD
A-CHK
B-CHK
C-CHK
D-CHK
Do Not Stuff
R97
R98
R99
R104
R18
1K
R23
1K
R10
1K
R79
220
R8
220
R76
3.8K
R1
3.6K
R2
20k
R77
20k
C36
.047uF
C2
.047uF
U2A
LM324
U2B
LM324
U2C
LM324
U2D
LM324
R28
1K
R27
220
R24
Do Not Stuff
C11
Do Not Stuff
R25
20k
R78
1K
R17
220
C6
.047uF
R11
3.6K
R12
20k
C1
.01uF
12V
D26 5V
D13
1N914
1N914
R51
1K
R53
1K
R50
VFPR
D11
1N914
D5
1N914
5V
D14
1N914
C5
.01uF
R38
100k
C22
.01uF
R32
100K
C21
.01uF
R35
220
R43
R39
1K
1K
K1
K2
Vrelay
D8
12V
U5A
U5B
ICE-AUG
CUBE-CRUSH
TO FIG
45B
TO FIG
45C

FIG. 45A

FIG. 45B


U8 250tab
U9 250tab
U11 250tab
U12 250tab
RUN
DEFROST
PAN HEAT
DFZ
DFF
560
558
588
J13 640445-4
K3
K4
K7
Vrelay
Q9 2N440
D7
DEFROST
R52 10K
R44 4.7K
P19
U5C
U5D
U5E
U5F
U5G
COMP
H2O - DISP
PAN HEATER (MONOGRAM ONLY)
DEFROST
QCHILL
D9 1N4007
D10 1N4007
R70 22K
R62 22K
R68 22K
R66 22K
R59 22K
R67 22K
12V
Q7 2N4403
R33 2.4K
R37 Do Not Stuff
Q8 2N4401
R36 2.4K
R40 22K
R22 2.4K
D6 1N914
R31 330K
C16 4.7uF
R48 10K
C14 10uF
TO FIG 45A
TO FIG 45D
U7A PC827
U7B PC827
R60 22K
C18 33uF
R65 100K
C7 33uF
5V

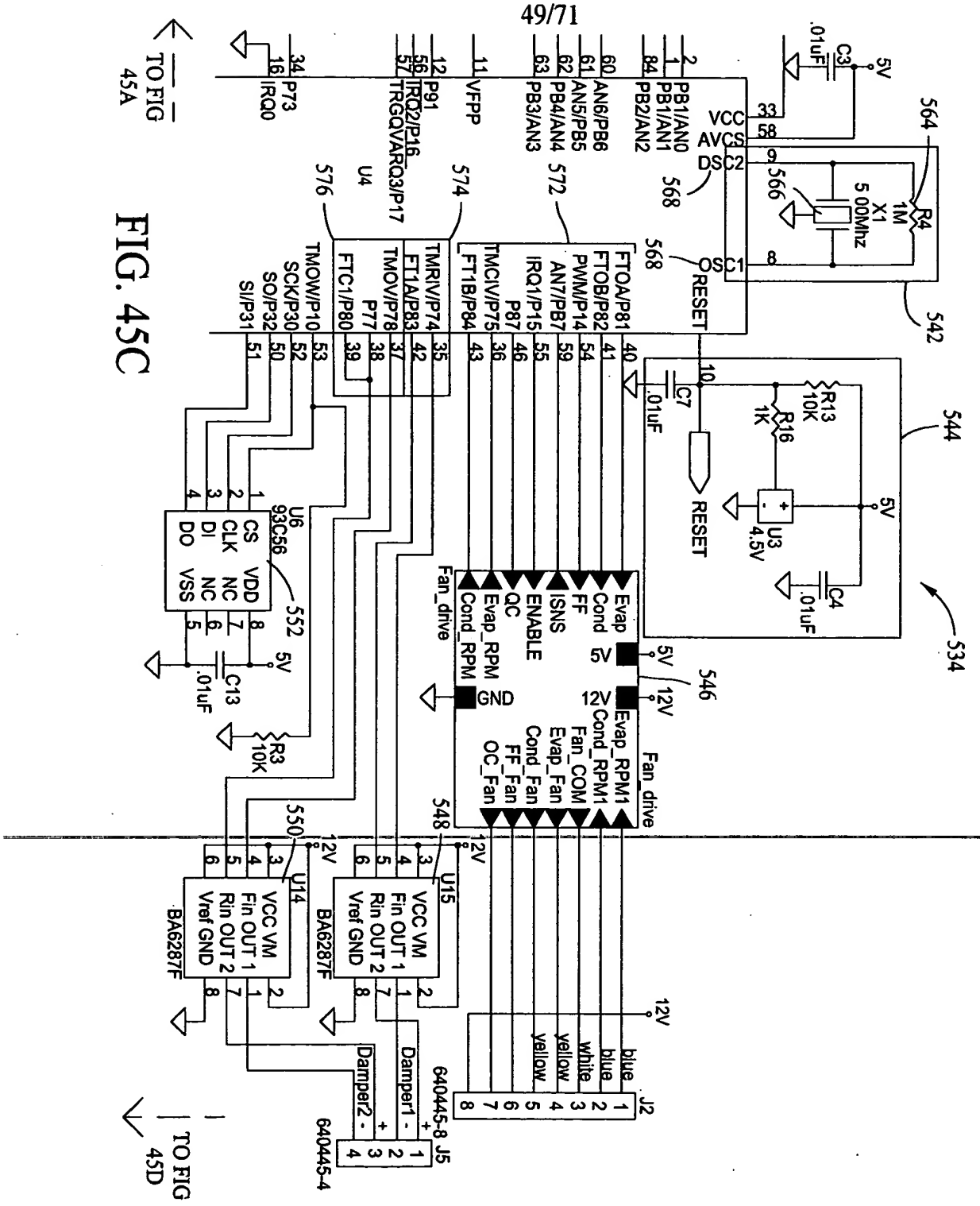

TO FIG 45A
TO FIG 45D
5V
C3 .01uF
564
X1 5.00Mhz
R4 1M
566
568
542
544
534
R13 10K
R16 1K
C7 .01uF
C4 .01uF
U3 4.5V
RESET
VCC
AVCS
DS
OSC1
OSC2
PB1/AN0
PB1/AN1
PB2/AN2
AN6/PB6
AN5/PB5
PB4/AN4
PB3/AN3
VFPP
P91
IRQ2/P16
TRGQVARQ3/P17
P73
IRQ0
U4
572
574
576
FTOA/P81
FTOB/P82
PWM/P14
AN7/PB7
IRQ1/P15
P87
TMCIV/P75
FT1B/P84
TMRIV/P74
FT1A/P83
TMOV/P78
P77
FTC1/P80
TMOW/P10
SCK/P30
SO/P32
SI/P31
Evap
Cond
FF
ISNS
ENABLE
QC
Evap_RPM
Cond_RPM
Fan_drive
GND
12V
546
Evap_RPM1
Cond_RPM1
Fan_COM
Evap_Fan
Cond_Fan
FF_Fan
OC_Fan
Fan_drive
U6 93C56
CS
CLK
DI
DO
VDD
NC
NC
VSS
552
C13 .01uF
R3 10K
548
550
U14
U15
VCC VM
Fin OUT 1
Rin OUT 2
Vref GND
Rin OUT 1
Vref GND
BA6287F
Damper1 -
Damper2 -
640445-8 J5
640445-4
J2
blue
white
yellow
yellow
blue

FIG. 45C

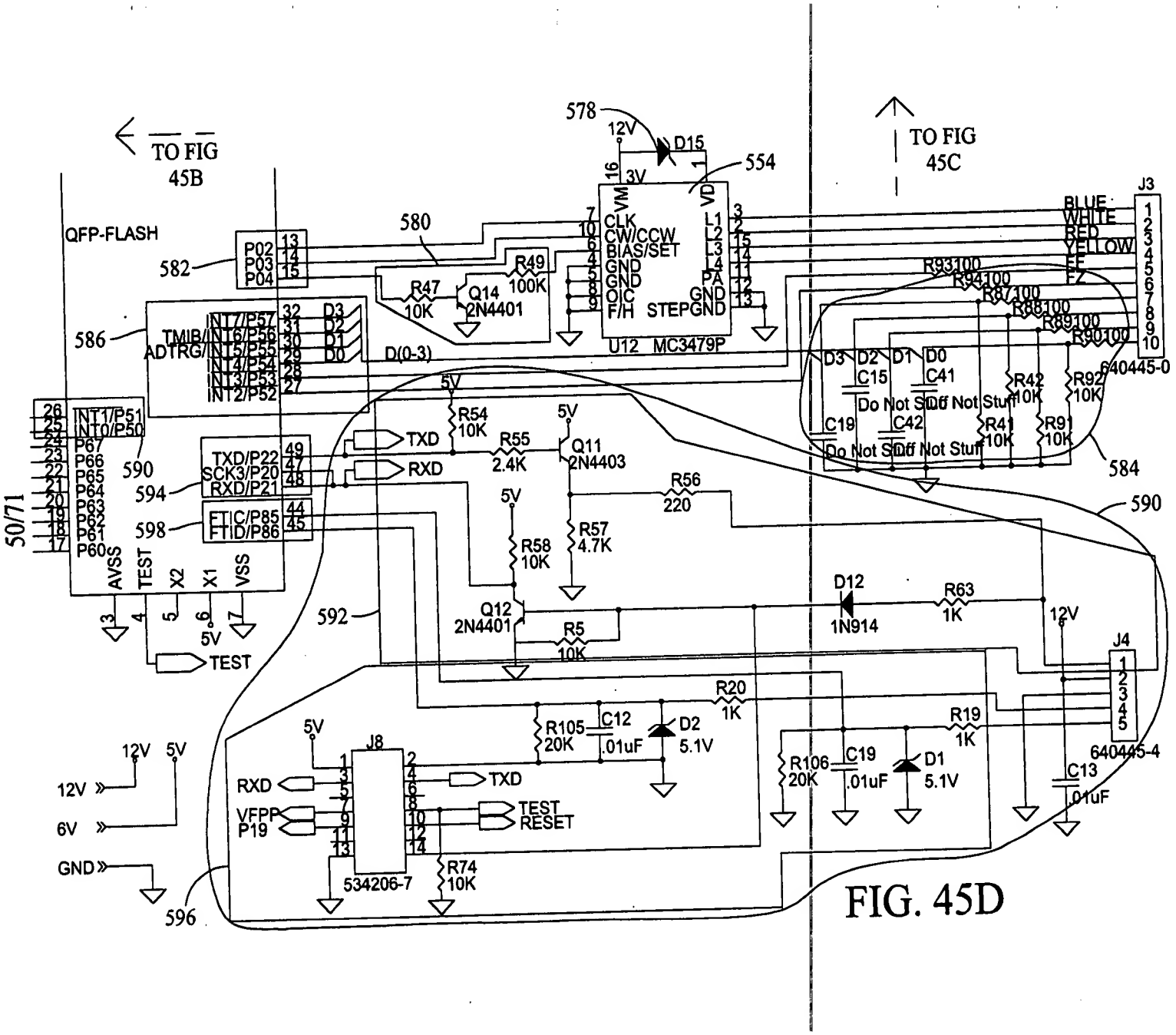

TO FIG 45B
TO FIG 45C
QFP-FLASH
U12 MC3479P
D15
Q14 2N4401
Q11 2N4403
Q12 2N4401
D12 1N914
D2 5.1V
D1 5.1V
534206-7
640445-0
640445-4
Do Not Stuff
TXD
RXD
TEST
RESET
VFPP P19
50/71

FIG. 45D

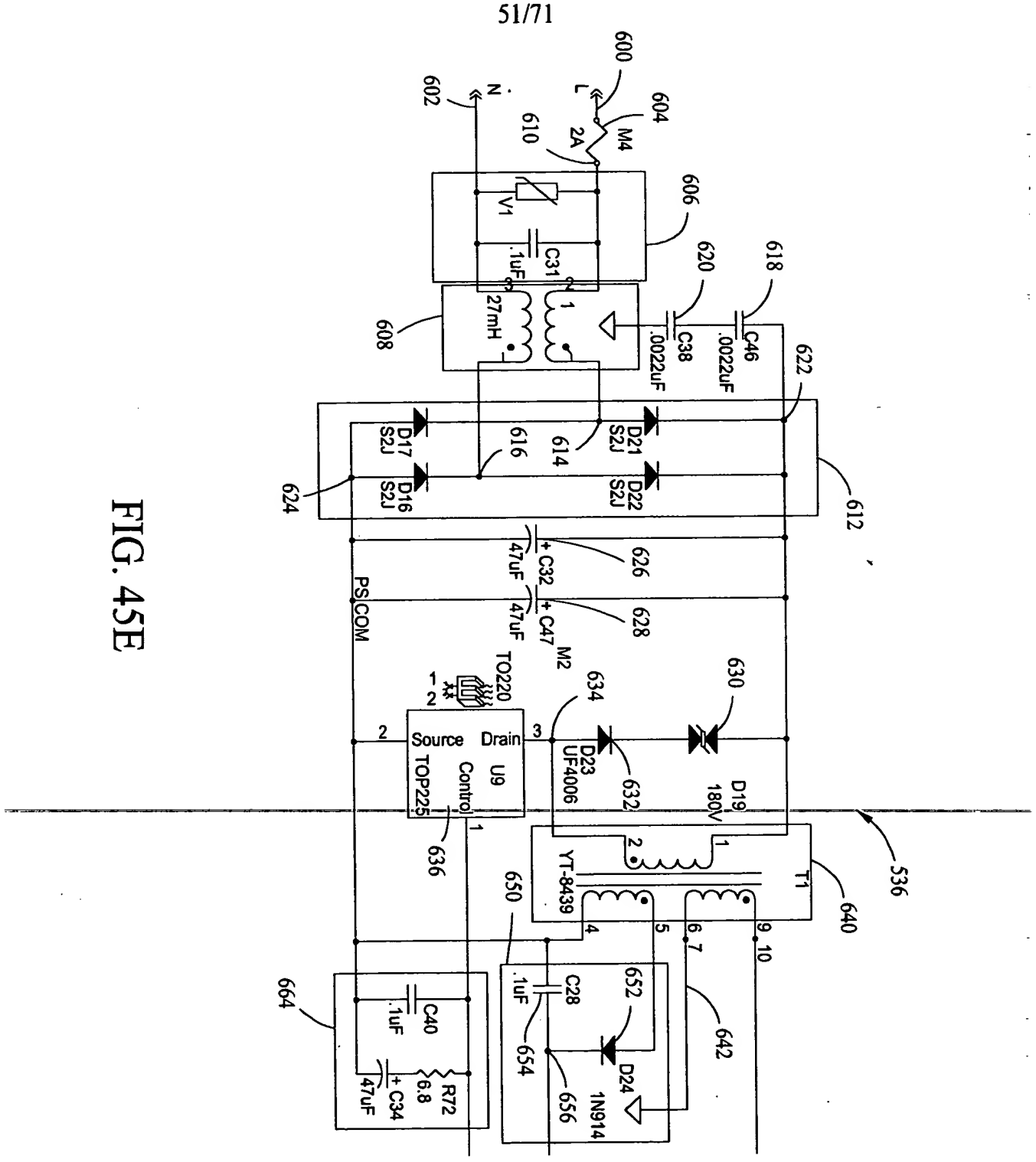

600
L
602
N
604
M4
2A
610
V1
.1uF
C31
606
608
27mH
620
.0022uF
C38
618
.0022uF
C46
622
D17
S2J
D16
S2J
616
614
D21
S2J
D22
S2J
624
612
47uF
C32
626
47uF
C47
628
PS COM
M2
TO220
Source
Drain
U9
TOP225
Control
634
630
D23
UF4006
D19
180V
632
636
536
T1
YT-8439
640
650
.1uF
C28
652
642
654
656
D24
1N914
664
.1uF
C40
47uF
C34
6.8
R72

FIG. 45E

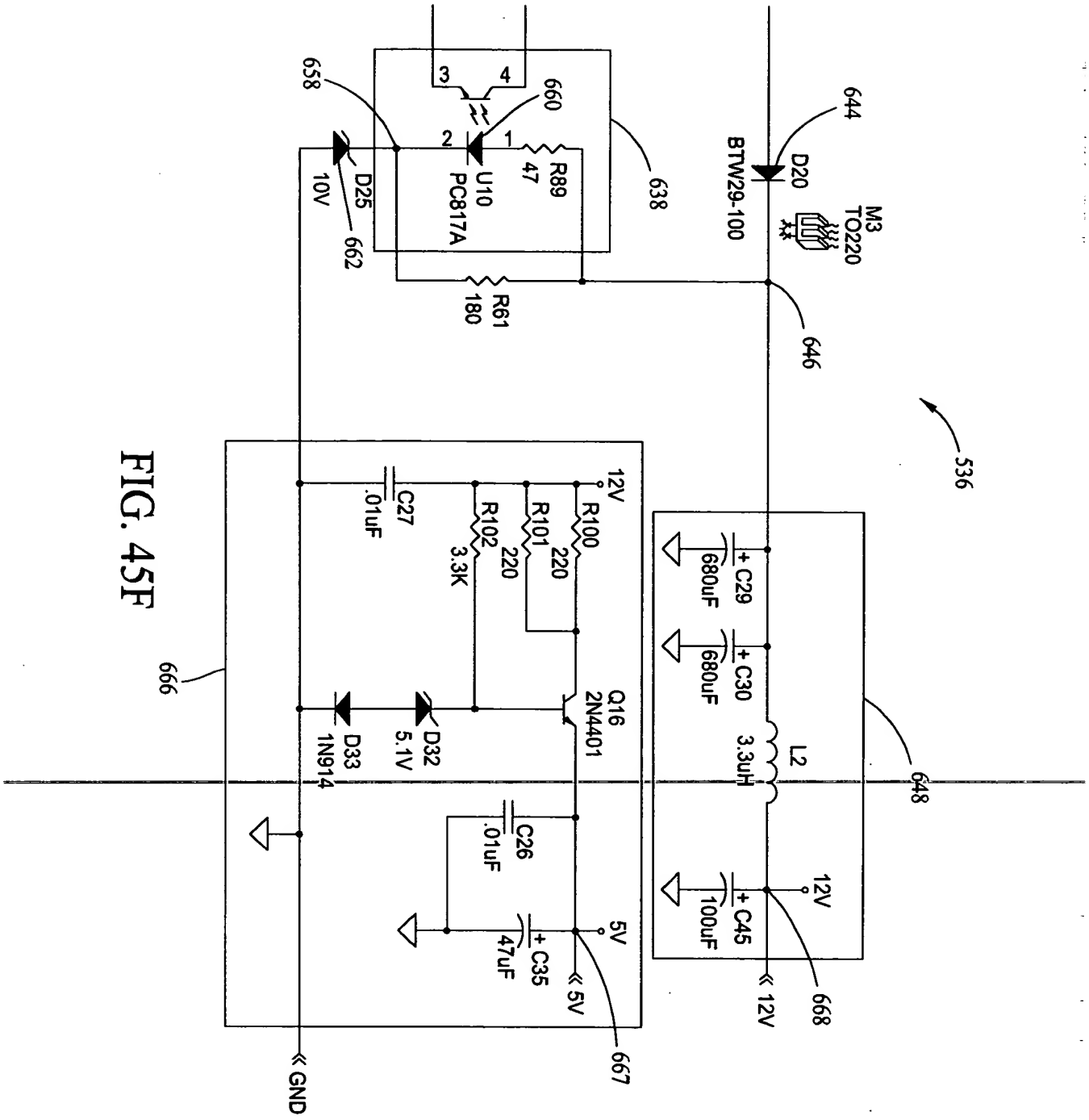

536
644
D20
BTW29-100
M3
TO220
646
638
658
660
662
D25
10V
U10
PC817A
R89
47
R61
180
3
4
2
1
648
L2
3.3uH
+ C29
680uF
+ C30
680uF
+ C45
100uF
12V
« 12V
668
666
12V
R100
220
R101
220
R102
3.3K
C27
.01uF
Q16
2N4401
D32
5.1V
D33
1N914
C26
.01uF
+ C35
47uF
5V
« 5V
667
« GND

FIG. 45F

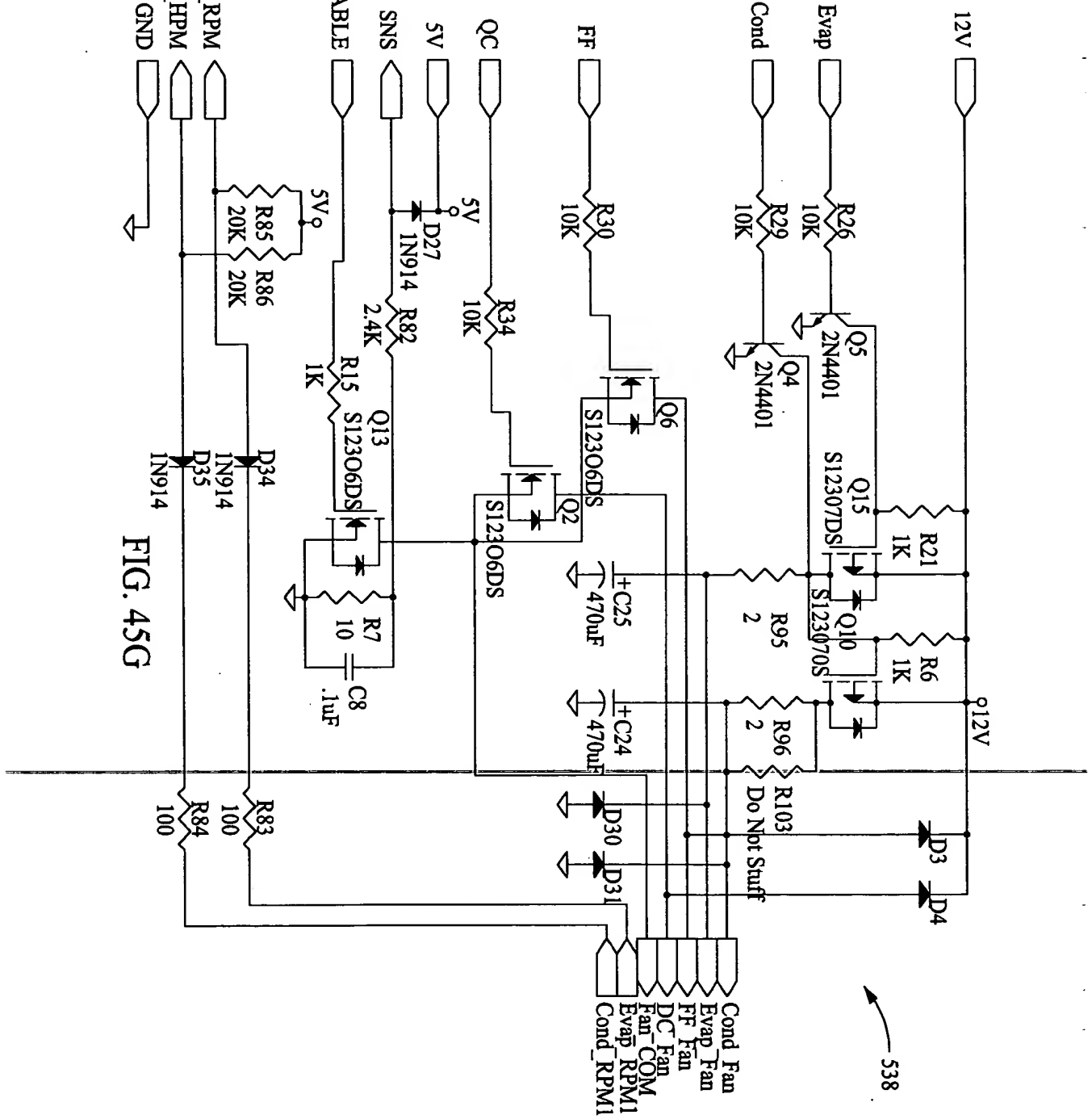

12V
Evap
Cond
FF
QC
5V
SNS
ENABLE
Evap_RPM
Cond_HPM
GND
R26 10K
R29 10K
R30 10K
R34 10K
R21 1K
R6 1K
R95 2
R96 2
R103 Do Not Stuff
Q5 2N4401
Q4 2N4401
Q15 S12307DS
Q10 S12307DS
Q6 S12306DS
Q2 S12306DS
Q13 S12306DS
+C25 470uF
+C24 470uF
C8 .1uF
R7 10
R82 2.4K
R15 1K
D27 1N914
D30
D31
D3
D4
D34 1N914
D35 1N914
R85 20K
R86 20K
R83 100
R84 100
5V
Cond_Fan
Evap_Fan
FF_Fan
DC_Fan_COM
Evap_RPM1
Cond_RPM1
538

FIG. 45G

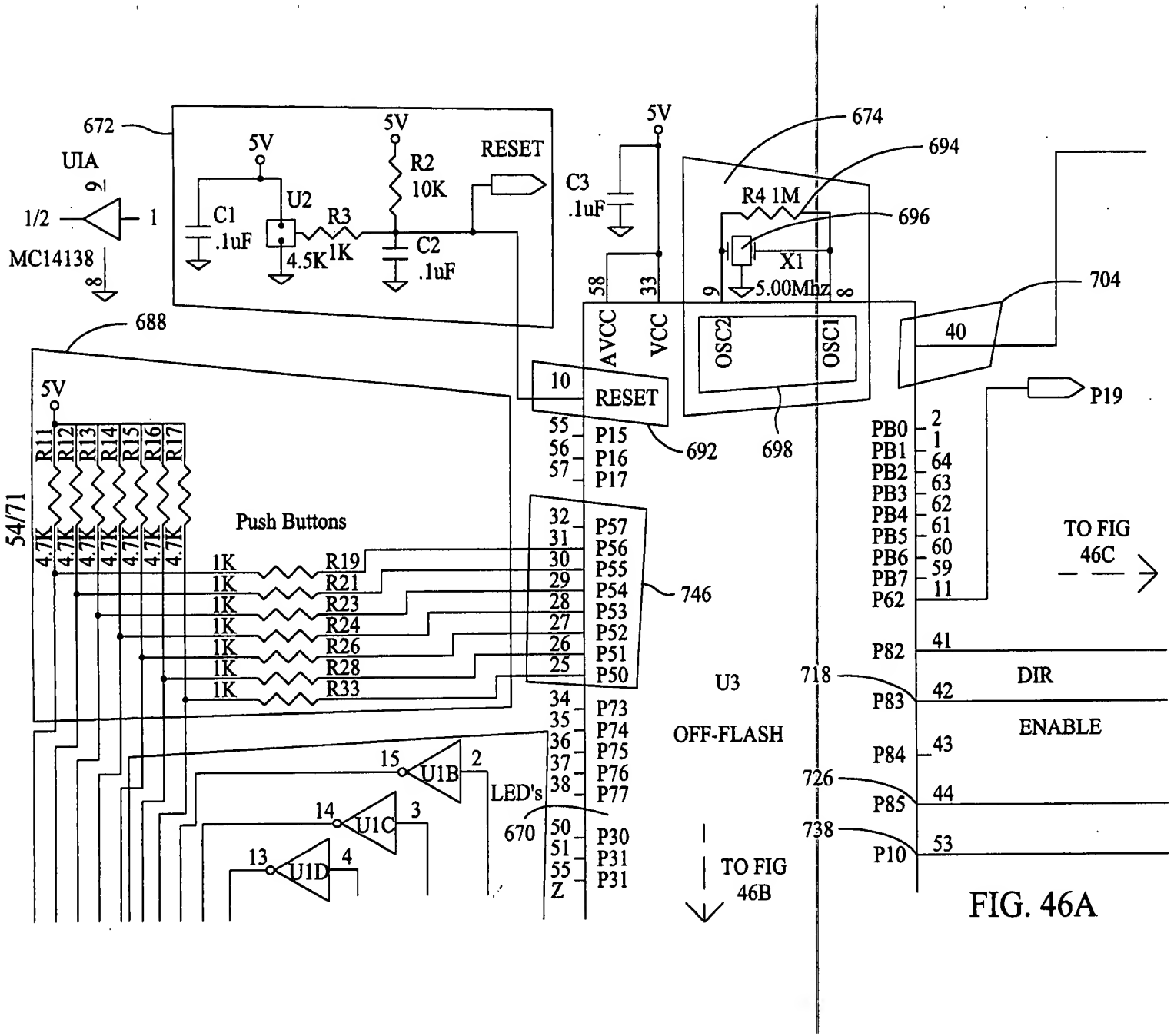

672
UIA
1/2
MC14138
5V
C1
.1uF
U2
4.5K
R3
1K
R2
10K
C2
.1uF
RESET
C3
.1uF
674
694
R4 1M
696
X1
5.00Mhz
704
688
AVCC
VCC
OSC2
OSC1
40
10
RESET
692
698
P19
55 P15
56 P16
57 P17
PB0 2
PB1 1
PB2 64
PB3 63
PB4 62
PB5 61
PB6 60
PB7 59
P62 11
TO FIG 46C
54/71
R11 R12 R13 R14 R15 R16 R17
4.7K
Push Buttons
1K R19
1K R21
1K R23
1K R24
1K R26
1K R28
1K R33
32 P57
31 P56
30 P55
29 P54
28 P53
27 P52
26 P51
25 P50
746
U3
OFF-FLASH
34 P73
35 P74
36 P75
37 P76
38 P77
P82 41
718
DIR
P83 42
ENABLE
P84 43
726
P85 44
738
P10 53
U1B
U1C
U1D
LED's
670
50 P30
51 P31
55 P31
Z
TO FIG 46B

FIG. 46A

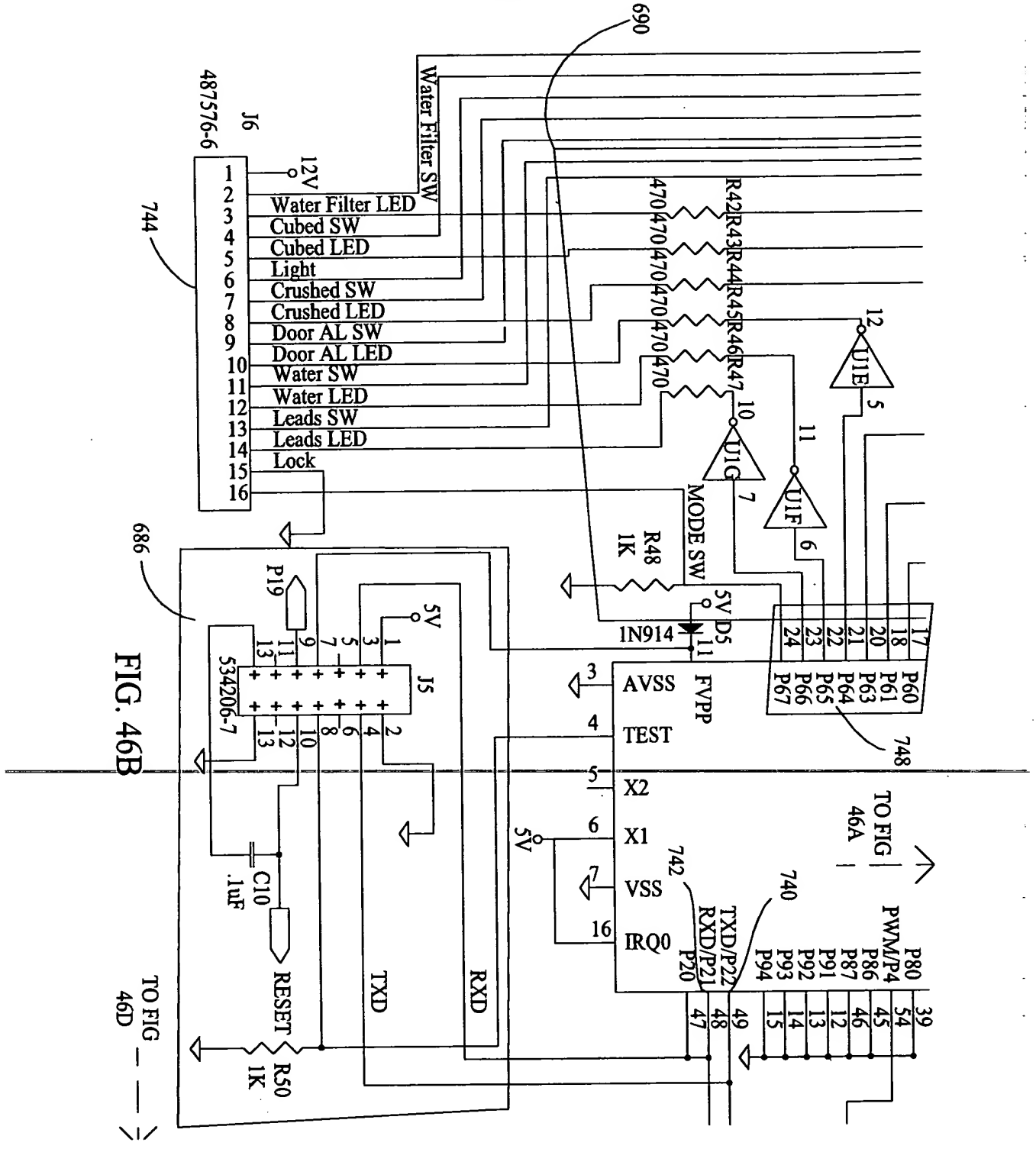

690
487576-6
J6
744
12V
Water Filter SW
Water Filter LED
Cubed SW
Cubed LED
Light
Crushed SW
Crushed LED
Door AL SW
Door AL LED
Water SW
Water LED
Leads SW
Leads LED
Lock
R42 470
R43 470
R44 470
R45 470
R46 470
R47 470
U1E
U1G
U1F
MODE SW
R48 1K
5V
D5
1N914
686
P19
J5
534206-7
C10 .1uF
RESET
R50 1K
TXD
RXD
AVSS
TEST
X2
X1
VSS
IRQ0
FVPP
748
742
740
TXD/P22
RXD/P21
P20
P60 P61 P63 P64 P65 P66 P67
P80 P86/PWM/P4 P87 P91 P92 P93 P94
TO FIG 46A
TO FIG 46D

FIG. 46B

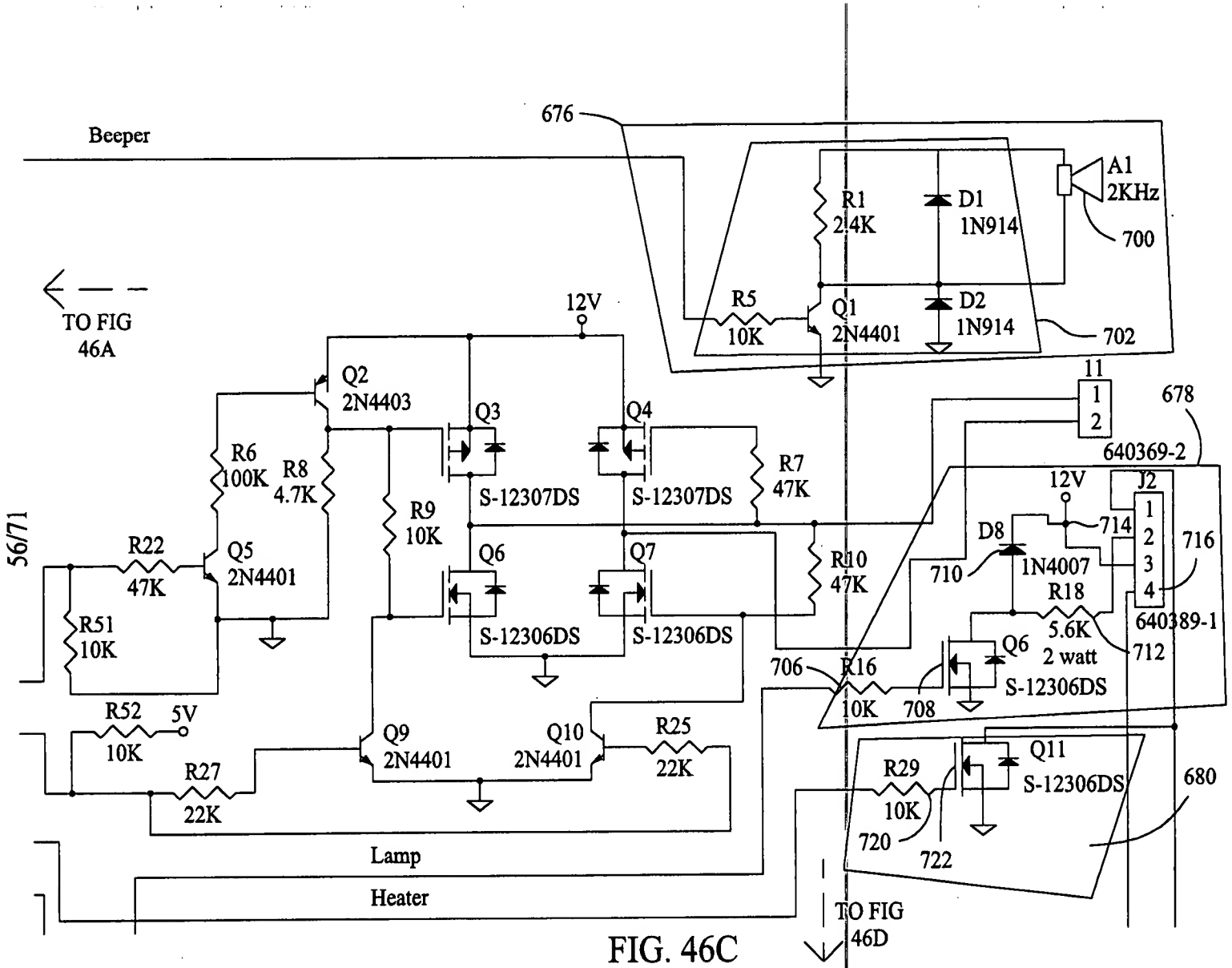

Beeper
676
A1
2KHz
700
R1
2.4K
D1
1N914
R5
10K
Q1
2N4401
D2
1N914
702
TO FIG
46A
12V
Q2
2N4403
Q3
Q4
R6
100K
R8
4.7K
S-12307DS
S-12307DS
R7
47K
R9
10K
56/71
R22
47K
Q5
2N4401
Q6
Q7
R10
47K
R51
10K
S-12306DS
S-12306DS
R52
10K
5V
Q9
2N4401
Q10
2N4401
R25
22K
R27
22K
Lamp
Heater
11
1
2
678
640369-2
12V
J2
714
D8
1N4007
710
716
1
2
3
4
R18
5.6K
2 watt
640389-1
712
Q6
S-12306DS
706
R16
10K
708
Q11
S-12306DS
R29
10K
720
722
680
TO FIG
46D

FIG. 46C

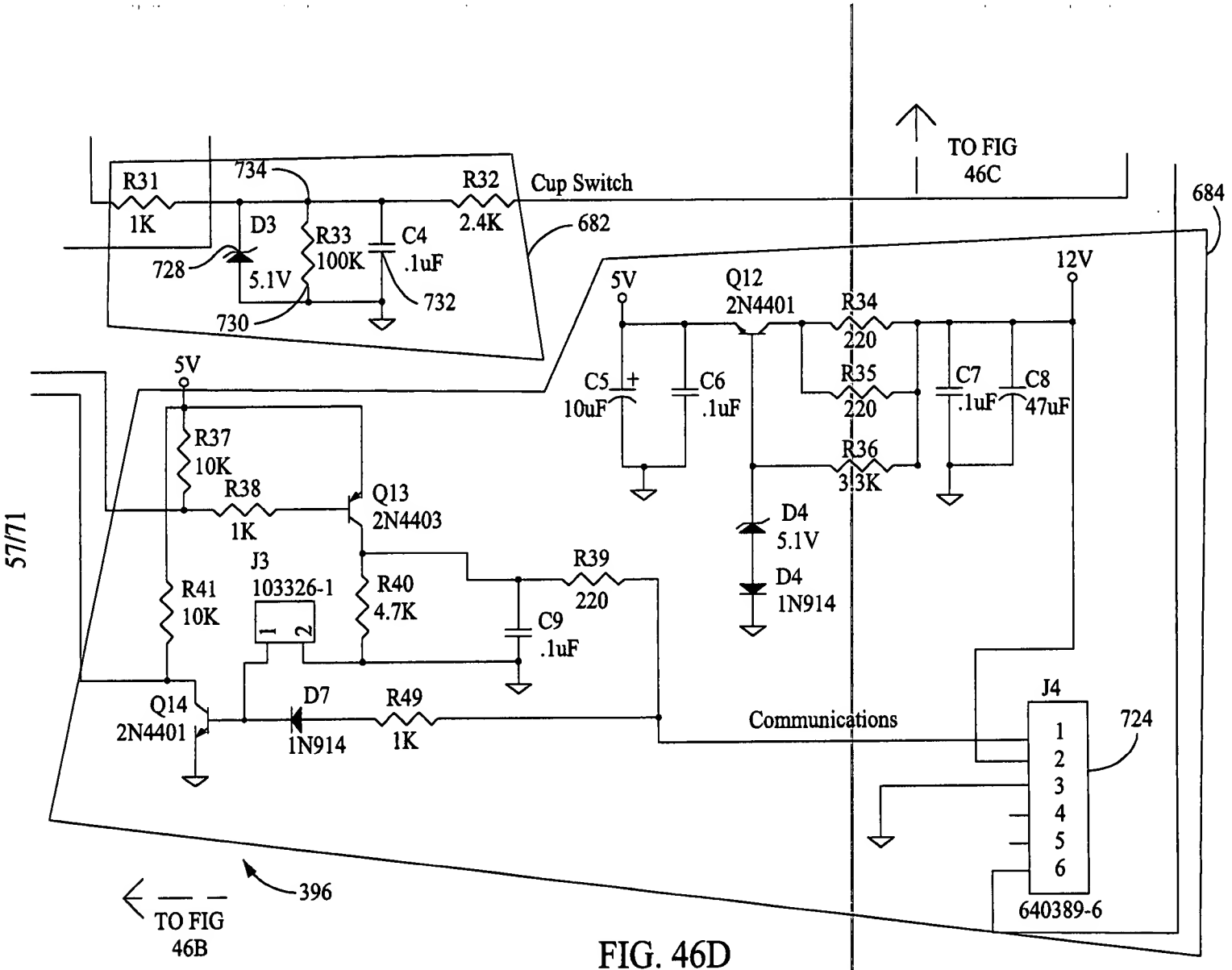

TO FIG
46C
684
R31
1K
734
D3
5.1V
R33
100K
C4
.1uF
R32
2.4K
Cup Switch
682
728
730
732
5V
Q12
2N4401
R34
220
12V
C5
10uF
C6
.1uF
R35
220
C7
.1uF
C8
47uF
R36
3.3K
D4
5.1V
D4
1N914
57/71
R37
10K
R38
1K
Q13
2N4403
J3
103326-1
R41
10K
R40
4.7K
R39
220
C9
.1uF
Q14
2N4401
D7
1N914
R49
1K
Communications
J4
1
2
3
4
5
6
724
640389-6
396
TO FIG
46B

FIG. 46D

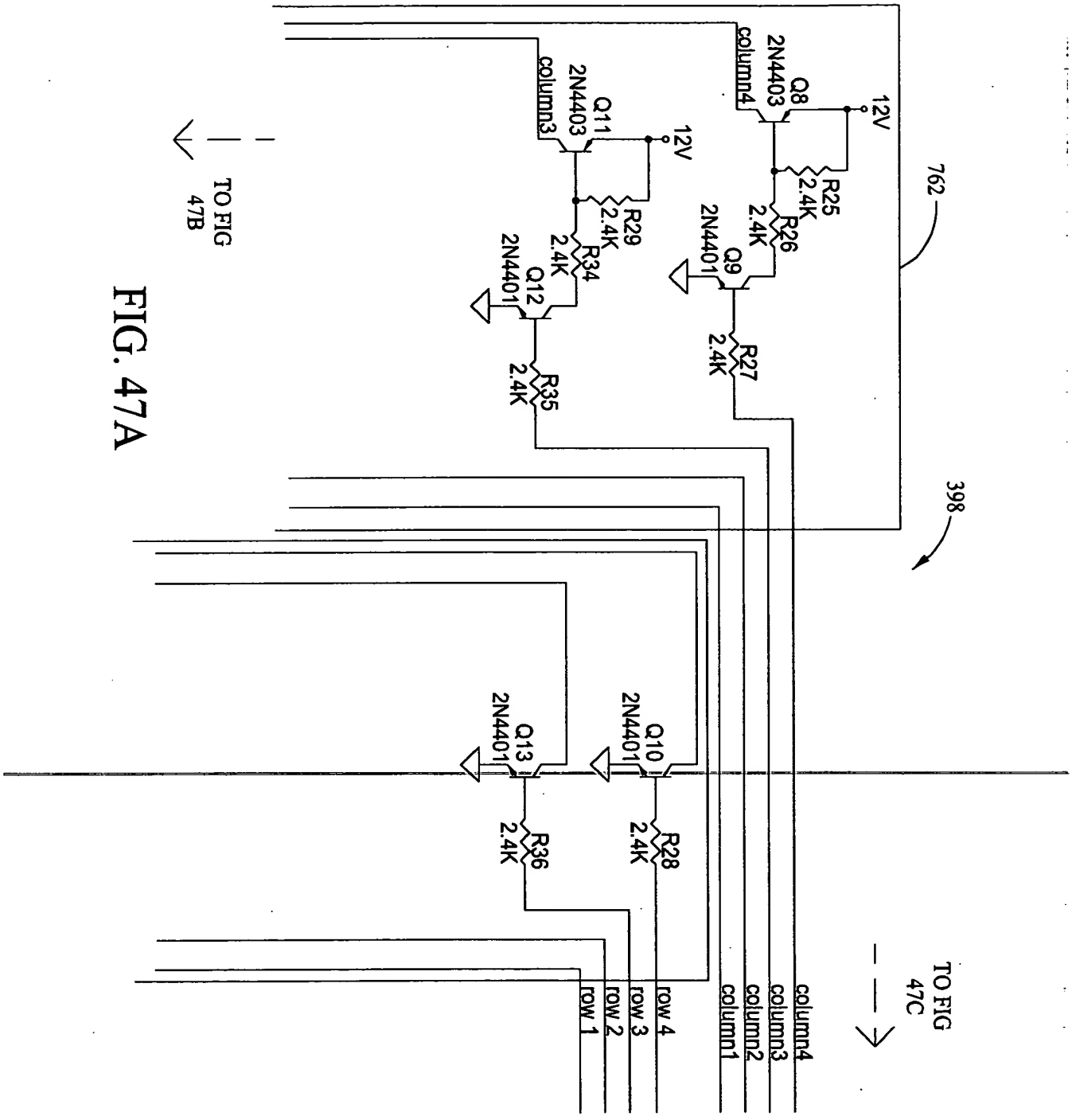

762
398
12V
Q8
2N4403
column4
R25
2.4K
R26
2.4K
Q9
2N4401
R27
2.4K
12V
Q11
2N4403
column3
R29
2.4K
R34
2.4K
Q12
2N4401
R35
2.4K
TO FIG
47B
Q13
2N4401
Q10
2N4401
R36
2.4K
R28
2.4K
row 1
row 2
row 3
row 4
column1
column2
column3
column4
TO FIG
47C

FIG. 47A

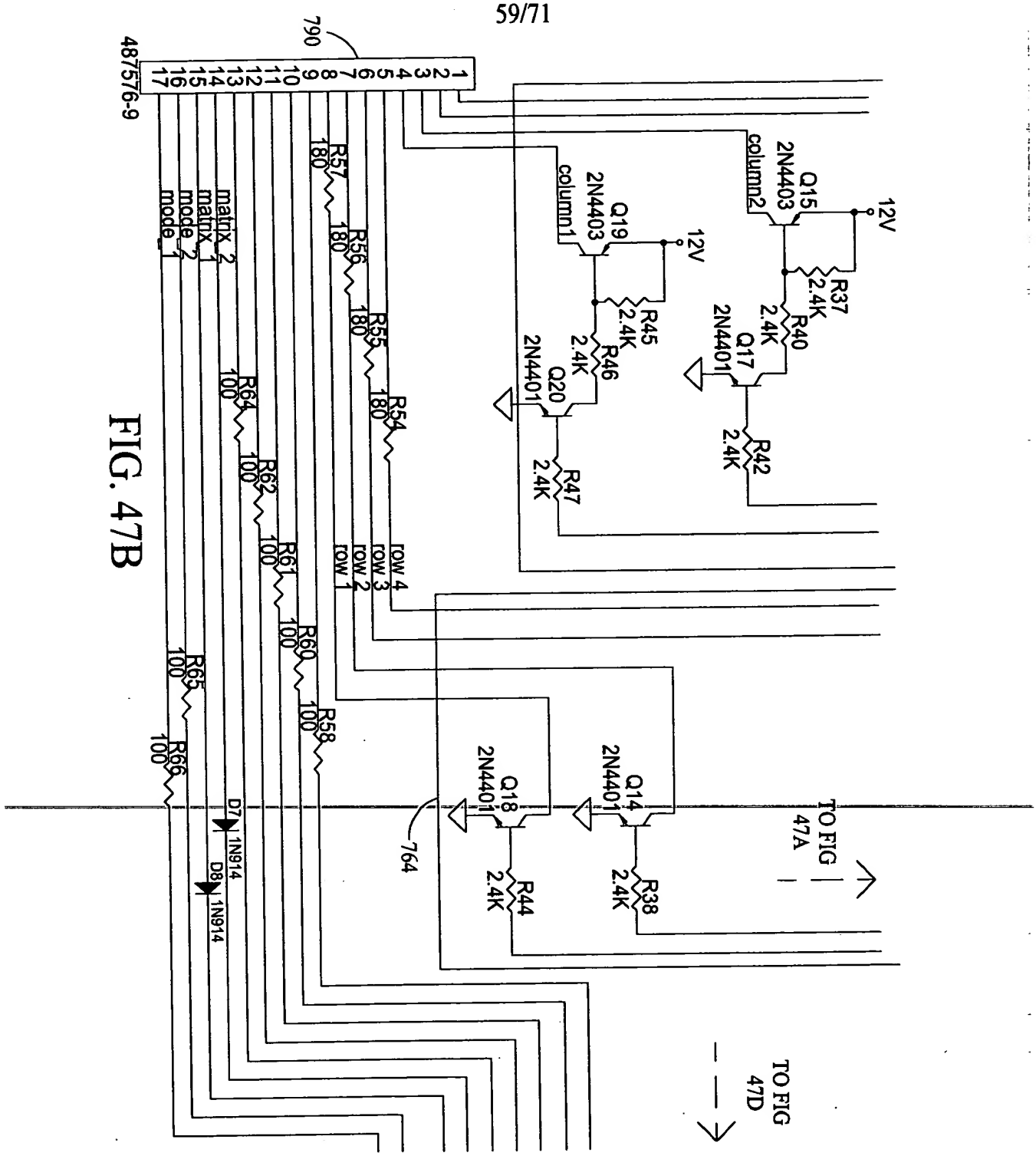

790
487576-9
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
matrix_2
matrix_1
mode_2
mode_1
R57 180
R56 180
R55 180
R54 180
R64 100
R62 100
R61 100
R60 100
R58 100
R65 100
R66 100
D7 1N914
D8 1N914
764
Q18 2N4401
Q14 2N4401
R44 2.4K
R38 2.4K
TO FIG 47A
TO FIG 47D
row 4
row 3
row 2
row 1
Q15 2N4403
column2
Q19 2N4403
column1
12V
12V
R37 2.4K
R40 2.4K
Q17 2N4401
R42 2.4K
R45 2.4K
R46 2.4K
Q20 2N4401
R47 2.4K

FIG. 47B

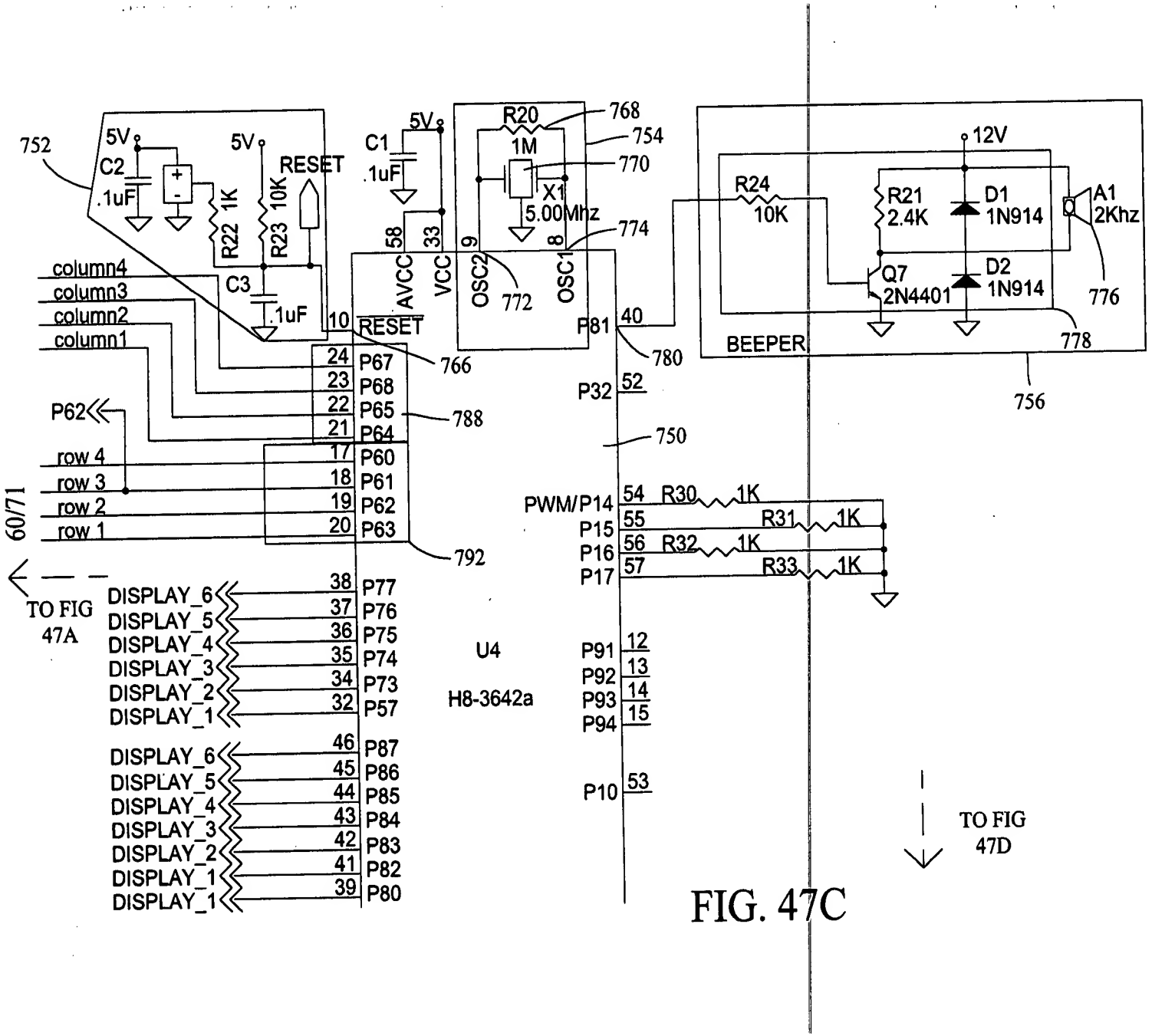

752
5V
C2
.1uF
5V
RESET
R22 1K
R23 10K
C3
.1uF
column4
column3
column2
column1
P62
row 4
row 3
row 2
row 1
60/71
TO FIG 47A
DISPLAY_6
DISPLAY_5
DISPLAY_4
DISPLAY_3
DISPLAY_2
DISPLAY_1
DISPLAY_6
DISPLAY_5
DISPLAY_4
DISPLAY_3
DISPLAY_2
DISPLAY_1
DISPLAY_1
38 P77
37 P76
36 P75
35 P74
34 P73
32 P57
46 P87
45 P86
44 P85
43 P84
42 P83
41 P82
39 P80
5V
C1
.1uF
R20
1M
768
754
770
X1
5.00Mhz
774
58 AVCC
33 VCC
9 OSC2
8 OSC1
772
10 RESET
766
24 P67
23 P68
22 P65
21 P64
788
17 P60
18 P61
19 P62
20 P63
792
U4
H8-3642a
P81 40
780
P32 52
750
PWM/P14 54 R30 1K
P15 55 R31 1K
P16 56 R32 1K
P17 57 R33 1K
P91 12
P92 13
P93 14
P94 15
P10 53
12V
R24
10K
R21
2.4K
D1
1N914
A1
2Khz
Q7
2N4401
D2
1N914
776
778
BEEPER
756
TO FIG 47D

FIG. 47C

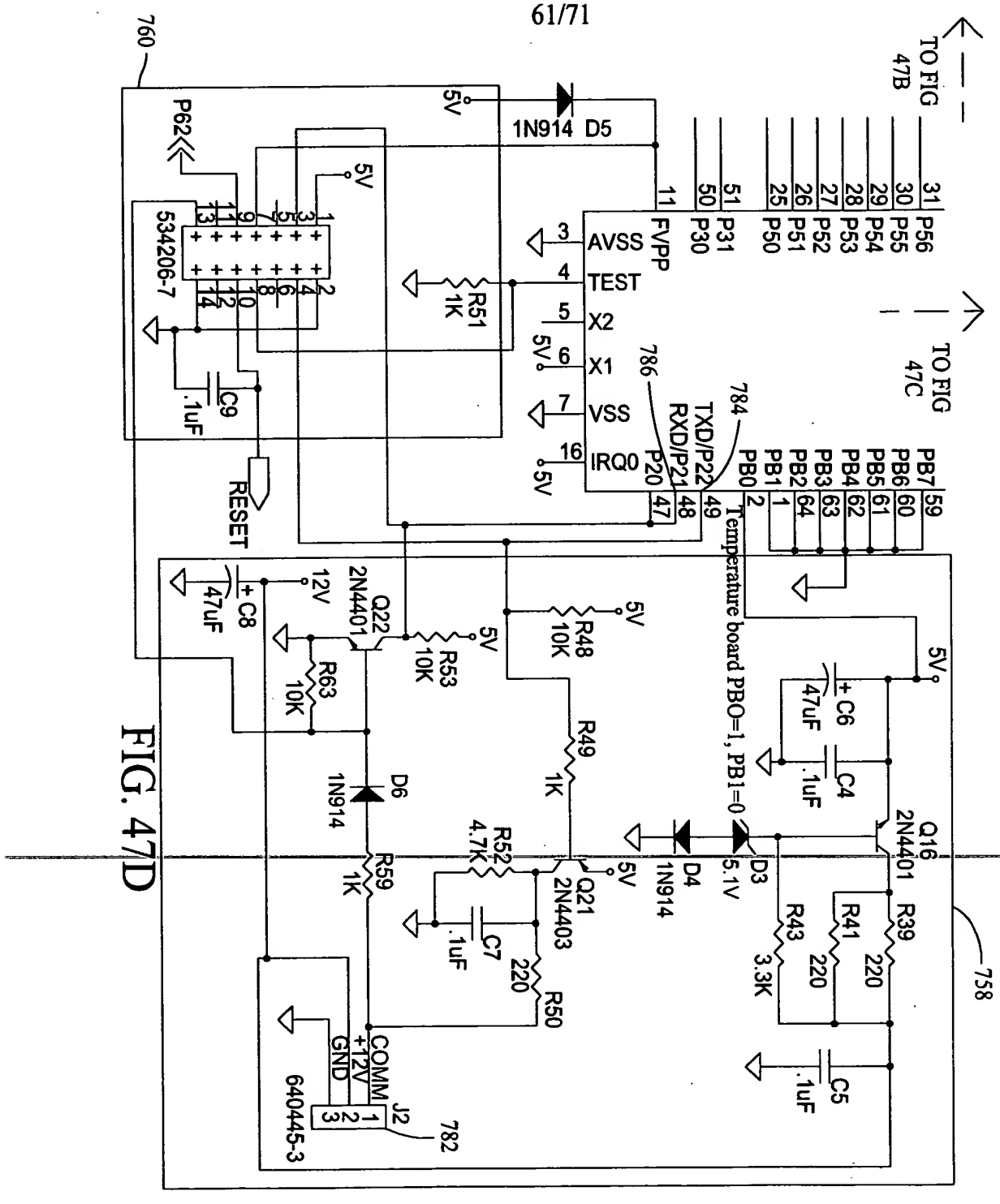

TO FIG 47B
TO FIG 47C
P56
P55
P54
P53
P52
P51
P50
P31
P30
FVPP
AVSS
TEST
X2
X1
VSS
IRQ0
TXD/P22
RXD/P21
P20
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
1N914 D5
5V
P62
534206-7
R51 1K
.1uF C9
RESET
760
786
784
Temperature board PBO=1, PB1=0
758
47uF C8
12V
Q22 2N4401
R63 10K
R53 10K
R48 10K
R49 1K
47uF C6
.1uF C4
Q16 2N4401
D6 1N914
R52 4.7K
R59 1K
D4 1N914
D3 5.1V
R43 3.3K
R41 220
R39 220
Q21 2N4403
.1uF C7
220 R50
.1uF C5
COMM
+12V
GND
J2
640445-3
782

FIG. 47D